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REPORT

OF THE

PROCEEDINGS

OF THE

SEVENTEENTH ANNUAL BLISTER RUST CONTROL CONFERENCE

HELD AT

Lakeville, Connecticut, October 29-31, 1931.

PROGRAM ANNUAL BLISTER RUST CONTROL CONFERENCE

Lakeville, Connecticut
October 29 and 30, 1931.

Headquarters: Gateway Inn

Conference sessions: Friendly Hall.

October 29

General Meeting (9:00 a.m. to 12:30 p.m.) - Chairman: Mr. W.G. Howard, Superintendent, Division of Lands and Forests, New York State Conservation Department.

Greetings - Mr. A. F. Hawes, State Forester of Connecticut.

A state cooperator's viewpoint - Mr. W. O. Filley, Station Forester, Connecticut Agricultural Experiment Station.

Functions of the Office of Personnel and Business Administration - Mr. W. N. Rehlaender, Assistant to the Director.

Quarantine regulations and nursery sanitation - Mr. R. A. Sheals, In charge of transit inspection, Plant Quarantine & Control Administration.

Blister rust situation in West - Mr. S. B. Detwiler, Principal Pathologist, In charge, Division of Blister Rust Control.

Field Trip (1:30 p.m. to 5:00 p. m.) - Under direction of Mr. J. E. Riley, State Blister Rust Control Leader of Connecticut.

Inspection of classified pine areas, blister rust damage and effectiveness of control plots - talk on pine classification by Mr. H. L. McIntyre, Supervisor, Pest Control, New York - comments by Professor R. C. Hawley, Yale Forest School, and Mr. A. E. Fivaz, Forester, Division of Blister Rust Control.

Informal group conferences, as desired, during evening.

October 30

General Meeting (9:00 a. m. to 12:30 p.m.) - Chairman: Mr. A.W. Hurford, State Blister Rust Control Leader of Rhode Island.

Cooperative control work

Special papers and talks on educational features, black currant eradication, Acadia control project, control methods, basis and procedure of reeradication work, administrative matters and related subjects.

General Meeting (1:30 p.m. to 5:00 p.m.) - Chairman: Doctor J.S. Boyce, Yale Forest School.

Public relations in forestry work - Mr. Harris A. Reynolds, Secretary Massachusetts Forestry Association.

Control investigations
Special talks by Doctors Boyce, Clinton, Hahn, Hirt, Snell, Spaulding and others.

Report of committees

INDEX TO PAPERS

		Page No.
Program		2
Greetings	A. F. Hawes	6
A state cooperator's viewpoint	W. O. Filley	7
Papers on control work in Eastern States		
Educational features		
A roadside demonstration of white pine blister rust	L. E. Newman	8
Blister rust exhibits at fairs	W. O. Frost	12
Methods to encourage pine production and to secure application of control	R. G. Pierce	14
Preeradication surveys		
Determining the extent of the blister rust problem in the Lake States	H.N. Putnam	17
Pine classification in New York	H. L. McIntyre	21
A system of pine land classification and its use in cooperative control work in New York	A.E. Fivaz	23
Preeradication scouting - stop, look, listen	Perley Spaulding	27
Ribes eradication		
The black currant eradication project in Rhode Island	A. W. Hurford	28
Description of a method of "closed scouting"	J. W. Charlton	32
White pine blister rust control at Acadia National Park	K. K. Stimson	34
Chemical eradication of skunk currants in Massachusetts	William Clave	37
Chemical eradication of Ribes in New Hampshire	L. C. Swain	39
Basis and procedure in reeradicative work	C. C. Perry	43

INDEX TO PAPERS (Cont'd) Page No.

Papers on control investigations

General remarks . . . . . J. S. Boyce 46

Suggestions for further investigations..... 47

Pathological and mycological notes on fungi observed on white pine . . . . . G. G. Hahn 49

A brief review of the cooperative blister rust control investigation conducted at the Pack Demonstration Forest at Warrensburg, New York . . R. R. Hirt 51

Notes on three serious tree diseases . . . . . G. P. Clinton 56

Observations on reseeding of Ribes nigrum . E. W. Littlefield 62

Papers on special subjects

The production of five-leafed planting stock under specified sanitation conditions. . . R. A. Sheals 63

The spread of blister rust in the South . . . . . R. G. Pierce 68

Report of blister rust infection on white pine plantations established during 1929 and 1930 in Rhode Island with stock from an out-of-state nursery . . . . . A. W. Hurford 69

Blister rust situation in the West . . . . . S. B. Detweiler and G. B. Posey 72

Can the cost of blister rust control be justified? Elers Koch 76

Functions of the Office of Personnel and Business Administration . . . . . W. N. Rehlaender 79

Public relations in forestry work. . . . . H. A. Reynolds 87

European pine shoot moth . . . . . H. W. Hicock 88

Resolutions 92

Attendance 93

GREETINGS

By A. F. Hawes, State Forester, Connecticut

In welcoming this Conference to Connecticut, I believe that I can say that there is no state more awake to the danger of forest diseases, such as the blister rust, than Connecticut. While we do not have such extensive areas of white pine as states farther north, this has always been one of our most valued trees, and we are still mindful of the tremendous loss suffered by our forests through the chestnut blight. During the thirty years since the beginnings of forestry in Connecticut, this one disease has caused more damage and done more to discourage the practice of forestry than forest fires or anything else. In fact, I believe it safe to say that due to the reduction of fire damage our forests suffer more by and large from insects and disease than from fire.

It is a satisfaction to remark on the cordial relations which have always existed between the Connecticut Forestry Department and the Blister Rust Control organization under Mr. Filley. I hope that as time goes on your work may be expanded to include all forest diseases and insects. The pine weevil has probably done more in Connecticut to discourage the planting of white pine than the blister rust. In recent years red pine has been our favorite tree for planting. We are now confronted with a serious enemy of this species in the pine shoot moth which has done considerable damage in the southern part of the state. We will doubtless have other forest pests from time to time and you men with your training are best fitted to cope with them.

We now have 60,000 acres of state forests and cooperative associations controlling 90,000 acres of private forests. As our work expands we will need more trained district foresters. It seems to me that it should be possible to fuse this office with that of the blister rust agent so that the men handling pest control work would also have administrative work for I believe that the greatest satisfaction comes from an all-round practice of forestry. In research it is, of course, necessary to specialize.

After more than a quarter century in public forestry, I am inclined to feel that we have stressed too much the disadvantages and drawbacks in the practice of forestry. We have talked about fire, insects and disease, taxation and compound interest, weed trees and our poor markets. It is not strange if our land owners have come to look at timber growing as a poor business venture. Let us change our methods of attack and talk about the more encouraging things; our fine climate and soils; our nearness to the large markets; our variety of valuable species and the encouraging growth they can make under favorable circumstances. As a step toward remolding public opinion along these lines we have started to establish "forest study plots" at conspicuous points in our state forests and in well located private forests. We are selecting the best trees in these plots, trees which will be left for the final crop, and are marking these trees with a blue ribbon of paint.

Everyone knows what a blue ribbon means. The interest taken in these plots is already surprising. They are focusing public attention on the fine straight trees. The blue ribbon makes the tree stand out like a well dressed man or woman in a crowd.

In conclusion, it gives me great satisfaction to see so many here from different sections of the Northeastern and Lake States. I hope that the conference will be very helpful in formulating your policies.

A STATE COOPERATOR'S VIEWPOINT

By W. O. Filley, Forester, Connecticut Agricultural Experiment Station

The viewpoint of one state cooperator is not necessarily that of other state cooperators, since conditions vary considerably in the different states. However, all cooperators in blister rust control work have much in common, so that perhaps my own viewpoint based on sixteen years experience may be typical of the rest.

Our viewpoints have certainly changed considerably in the past sixteen years. Improved control methods have given us confidence in the possibility of checking the spread of blister rust. On the other hand changing conditions in the lumber market have raised serious questions as to the economic value of white pine.

A state cooperator, particularly if he is a forester, cannot see blister rust control as the only objective in life. It is only one of many factors in forest management which he must consider. In building up a forestry program for a state, the state cooperator must continually work for the future. To include blister rust control in such a program, he must have faith in the ultimate success of the control methods, as well as in the future value of white pine as a forest crop.

At the present time the production of white pine lumber is of very small importance in Connecticut. However, the value of white pine from the aesthetic point of view is much greater than it was fifteen years ago. Although I believe that changing conditions will again make local white pine lumber an important forest product in Connecticut, nevertheless it seems probable that the aesthetic value of white pine will continue to increase, so that it may always exceed the commercial value.

I see no reason why a forester should attempt to ignore this situation if his aim is the growing of forests. An argument for forestry based on aesthetic values may be stronger than one based on economic values alone. The aesthetic values are certainly as much in need of protection and their appeal is greater to many land owners.

The cooperator's viewpoint is much influenced by the success of the men in the field. If they are efficient and successful in their work, the cooperator can be optimistic regarding the future. If their work is not successful he is bound to be pessimistic. It may be that the work of the field men is to some extent influenced by the attitude of the state cooperator, but I believe their influence on the state cooperator's point of view is even greater.

It seems to me that the success of the work rests squarely on the shoulders of the field agent. He must not only educate the public and effectively organize the control work, but he must demonstrate its effectiveness to the state cooperator. In order to be able to do this, he might well carry on a bit of research work by means of well established sample plots on which observations can be made from season to season. If he can also get the owner of the land interested in such experiments to the extent of furnishing some labor, he might perhaps even make thinnings on such plots and demonstrate the possibility of improving the growth.

Such experimental work, if carried on by the large number of agents under the supervision of a research specialist, might have a great effect of the viewpoints of state cooperators, and greatly strengthened their faith in the future of white pine as a forest crop.

PAPERS ON CONTROL WORK IN EASTERN STATES

A ROADSIDE DEMONSTRATION OF WHITE PINE BLISTER RUST

By L. E. Newman, State Blister Rust Control Leader, New Hampshire

The members of this Conference who attended a like meeting last year at Littleton, N.H., will, no doubt, recall an infected woodlot situated along the Littleton-St. Johnsbury Highway four miles from the former town, and known at that time as the "Hill Area." Last fall, during the work of tagging pines, posting of the area and its approaches, several interruptions were experienced due to tourists who halted at the lot to inquire regarding our activities. Later on, some months after the Conference, comments were made to two or three of the blister rust agents by persons residing 40 to 50 miles away, stating that they had observed the Littleton area and considered this brief demonstration an excellent educational feature.

With the return of another eradication season came recollections of this interest by tourists and local persons, and since to my knowledge, the staging of a highway demonstration of white pine blister rust, with a permanent attendant, had never before been attempted, the project seemed worth while, provided funds were available and the plan approved by the Chief of the Bureau and the Division of Blister Rust Control.

Ultimately, such sanction was obtained, plans fairly well perfected, and a lease of a portion of this area, for one year, entered into between the Government and a Mr. Bilodeau, owner of the property. Through a recommendation of Dean Henry S. Graves, of the Yale Forest School, Mr. Frederick C. Simmons, Jr., was appointed a temporary Agent to act as the attendant. In order that he might be more familiar with the progress of blister rust control in the Northeastern States, acquainted with eradication methods and the appearance of the rust in all its stages, Mr. Simmons spent several days at the Boston office studying data supplied him, and in the field, working with an eradication crew, and inspecting severe centers of infection, such as the Waterford, Landaff and Littleton areas.

Late in June, Mr. Filler, Simmons and the writer spent some time in reconstructing the area so that it would present an appearance similar to that of last fall. In addition a collection of local Ribes, Ribes cynosbati, glandulosum and triste, - was made, and largely for the psychological effect upon prospective visitors, these plants were housed in a screening of cheese cloth. A 7 x 9 tent, over which was spread a 12 x 15 fly, was erected asdemonstration headquarters, and also served as a place to keep the supply of bulletins and circulars received from the several states and the Department, and incidently, as a shelter for the attendant in case of rain.

A series of large signs were placed at intervals along the highway for a distance of approximately a quarter of a mile in either direction, and served to announce to motorists that the demonstration lay ahead. A canvas banner, nearly 2 feet in width and 20 feet in length, with the inscription, "Blister Rust Demonstration," was strung across the area between two large pines, some 70 feet from the highway and parallel to it.

Since tourists found the one opening into the area somewhat difficult to negotiate, permission was secured from the owner to remove about 75 feet of the wire fence along the highway, and two wide driveways were laid out, one to accommodate west-bound traffic and the other for cars headed in the opposite direction. Such a piece of construction while almost necessary in order to avoid traffic congestion, (for the highway is somewhat narrow) also served as an incentive for tourists to enter the area.

Two items for Littleton and St. Johnsbury newspapers were written, although these were intended more for the benefit of persons residing in that region rather than as an attempt to corral the interest of out-of-state visitors.

Results Secured

Before presenting any personal opinions as to the success or failure of this demonstration, or endeavoring to offer suggestions as to the layout and conduct of any such similar type of educational activity in the future, the actual results, as recorded on the pages of a register, will be given.

From July 3rd to the 12th of September, inclusive, 458 cars, containing about 2,000 persons, registered from 26 states, 4 Canadian provinces and two foreign countries.

An analysis of the probable motives of the 458 registrants who visited the area indicated that 36% had no more than a mild curiosity about the disease. This group was from the larger cities, or residing outside the pine-growing regions. Thirty-two per cent were interested in blister rust, or some other pest on individual ornamental trees and shrubs. Records indicated that 11% of those registering were interested in stands of ornamental pines. Many of this class are summer estate owners. About 10% were in public or semipublic work, such as members of water and park commissions, school teachers, state and federal forest employees, and others connected with public utility companies. Only 10% were farmers or lumbermen interested in white pine from a commercial point of view.

While I must confess that on the face of the above figures our demonstration was, apparently, unsuccessful in arousing interest in very many of that particular group of persons we seek to reach, towit, the forest owners, still nevertheless, we should not lose sight of the broader and perhaps, more far reaching benefits of this experiment. Let me cite but two cases to make more clear this statement.

One visitor proved to be the secretary of the American Association of Water Boards. He spent nearly an hour on the area and indicated keen interest in every phase of the rust and its control. At the conclusion of the demonstration he voiced the opinion that blister rust was a matter which should be called to the attention of every member of his association and that he proposed to accomplish this through an article on the rust to be published in the house organ of his society. Since we are aware that Water Boards and Commissions have planted probably millions of white pines around their watersheds, such a contact seemed to me worth while.

A similar impression developed from a visit by a member of the Essex County, New Jersey, Park Commission, who announced on leaving, that he would immediately upon returning home make an investigation as to the condition of the white pines which had been planted in large numbers by his Commission.

The registration by states was as follows: New Hampshire 93 cars; Massachusetts and New York 84 cars each; Vermont 49; New Jersey 31; Pennsylvania 23; Maine 15; Connecticut 14; Rhode Island and the District of Columbia 12 each; Canadian Provinces 9; Ohio 5; Michigan and Illinois 4 each; Wisconsin 3; Maryland, Indiana, Minnesota and Missouri 2 each and Oregon, Tennessee, Iowa, Delaware, Montana, Colorado, Oklahoma and Virginia one car each.

Records of the attendance by hours for the entire period indicated that the "peak" of visitors during the morning is between 10 and 12; while for the afternoon, from 3 to 4 is the busy hour. A traffic census carried on by the State Highway Department but a short distance from the area, and along the same highway, showed that the "peak of travel" coincided exactly with the periods of the day when the "peak of visitors" halted at the area.

A summary of the visitors by days of the week produced some very interesting food for thought, and brought out points not heretofore suspected, at least by the writer. As a rule, but few of the "week-end tourists," that is, those traveling from Saturday to Monday inclusive stopped at the demonstration. Tuesdays were good, but on the whole, Wednesday, Thursday and Friday were the days of greatest attendance.

As it has a strong tendency to influence other activities and business, so at the blister rust demonstration, the weather proved to be a factor which lowered the attendance. This was especially true during July, when rain fell very frequently. In fact, even cold, cloudy weather appears to dampen the spirits of the tourists as well as the local inhabitants, and seemed to be the only reason for more than ordinary pressure upon the car's accelerator.

Estimates on the volume of traffic along this highway, made by Mr. Simmons and the writer seemed to indicate an average of about 1200 - 1500 cars a day. However, figures secured through the courtesy of the State Highway Department indicated that the average was but 1091 each 24 hours.

Owing to construction work on several connecting highways in Vermont a considerable volume of the traffic ordinarily passing over this road en route either to New York or Canada or the White Mountains was deflected. This fact, attested to by the Littleton Information Booth as well as the Highway Department, undoubtedly robbed us of many other visitors.

Since so many persons traversing over highways may not be directly interested in white pine, it is entirely possible that an outdoor demonstration including, besides blister rust, such things as reforestation, fire prevention, etc., might assist greatly in causing more motorists to halt and inspect the area. It seems to the writer that just as we feel justified in utilizing interest in other forestry practices as a means towards spreading knowledge concerning blister rust, so we might profitably do likewise in attempting future outdoor demonstrations like that carried on in Littleton.

Discussion:

Mr. Pierce (D.C. office) wished to know if there was any time during the day when there were too many people at the demonstration for one man to take care of.

Mr. Newman(N.H.) replied in the affirmative, saying that Mr. Simmons lost many prospects because he was not able to give them his attention.

Mr. Hurford (R.I.)asked if there were many people who did not register.

Mr. Newman (N.H.) stated that such was the case, especially during the evening. He also commented that usually only the men in the cars would look over the demonstration.

Mr. Filler(Boston office) stated that there were many indirect results. It was estimated that about 85% of those passing, looked at the demonstration area as they drove by and at least learned that blister rust kills white pine and that it can be controlled.

Dr. Martin (D.C. office) spoke of Mr. Simmons' work at the public camping grounds in the vicinity during evenings. He talked to a number of persons at these places and in some cases aroused considerable interest.

Mr. Reynolds of Massachusetts suggested a permanent forestry exhibit be put up at places of great public interest such as the Flume in New Hampshire. These exhibits would be erected by the State and cover forestry extension, forest fire control, and blister rust control.

Mr. Ritter(Minn.) spoke of the number of people who visited the fire lookout stations in Minnesota. He said that he used a small blister rust exhibit in such locations.

Mr. Stevens (N.Y.) gave a short talk on the publicity work that they are doing in New York. Six or seven roadside demonstrations are maintained. These are retagged and repainted every year. He stated that it was important to acquire the confidence of the public in our work. In the same way that big concerns continue to advertise after they have secured public confidence, so must we in blister rust control work, continue with general educational work in order to hold the public confidence.

BLISTER RUST EXHIBITS AT FAIRS

By W. O. Frost, State Blister Rust Control Leader, Maine.

Notwithstanding the many hundredweight of blister rust literature distributed, the acres of newspaper articles printed, the scores of lectures given at granges, etc., and the thousands of personal interviews with field demonstrations, the general public knows very little about white pine blister rust.

The general public knows there is a disease called blister rust, and that currant and gooseberry bushes have something to do with it, but that is often the extent of its knowledge. The rank and file do not know how to identify the rust on the host plants, in fact are very apt to confuse it with many other diseases, or to think that any ailing white pine tree is affected with blister rust. Remarks such as these -- "Do I have to remove any raspberry bushes?" - "Is that bug killing the tops of my pines blister rust?" bear this out. Neither does the showing of a pickled specimen or a photograph leave a lasting impression.

It has been our experience that the best and only worthwhile way to make a lasting impression on the minds of the white-pine-interested

public is to let them see, feel and handle both host plants in as many stages of development as it is possible to obtain at the time - and above all else, show them infected pine specimens from the transplant stage to sawlog size, showing dead and dying trees with branch and trunk cankers of all ages. Two or three specimens create little interest, but when a young forest grows over night in some conspicuous place the curious are going to inquire "How come and what for," and are seeing something they will remember.

In order to stage such an exhibit a suitable space must be found where the demonstration will pay for itself since large exhibits require several days to set up and cost considerable money. It would hardly pay to have three or four men spend as many days setting up an exhibit for a one day display; the profits would not be in keeping with the expense. On the other hand, there are large public gatherings, lasting several days, where such an expenditure is justifiable.

Agricultural fairs offer the best opportunity for large sized exhibits, providing one is allowed to select his own space. As a rule, the space should be near agricultural exhibits and not too near the "midway." Our experience has been that by using diplomacy with the "groundsman" a week before the opening day, there is little difficulty in obtaining all the space one requires. It is always a good plan to tell him what you are trying to do, that the display is to be educational, that you represent the State and Federal Departments, and that you will set up something that will be worthwhile and beneficial to the fair patrons. If a good exhibit is staged, the Fair management will extend an invitation to exhibit the following year, as it lends a bit of color and uniqueness that is foreign to most fairs. The large trees are sure to attract the curious.

In the October issue of The Blister Rust News is a photo and brief description of an outdoor blister rust exhibit that was a grand success. Others of a similar size and nature were staged in different parts of the State and received much publicity and favorable comment. These particular demonstrations occupied a space about 40 x 40 feet which we consider the ideal size for a large fair. This size allows for the ample spacing of trees so that the public may saunter through the exhibit at leisure without bumping into one another or having their eyes poked out by branches or dead stubs. As we believe in showing large infected trees as well as small ones, about twenty living and dead trees ranging from 15 feet to 35 feet in height are used, being spaced so as to appear as near like a natural stand as possible. Among these large trees various varieties of Ribes are planted, both trees and Ribes being tagged with the blister rust tags. Smaller infected trees, about twenty of them, are spaced in the rear and on the sides of the exhibits, making a hedge-like row that make an ideal background to the displays. Pine duff to a depth of two inches, together with a sprinkling of pine cones, is spread on the ground. This helps to make a more woodsy and natural appearance.

Large exhibits allow for large banners and posters, especially the latter. Many a good small sized exhibit is ruined by large posters, but they are suitable for large spaces. However, too many of them will spoil the best of exhibits.

The use of vials of aeciospores and a high powered microscope are sure to create public curiosity. We believe that this feature is one of our best drawing cards, one that should be freely used. Many a lukewarm blister rust believer will change his opinion and have more faith in what our young "college fellows" are trying to describe if he has the seeds of the subject at hand from both host plants.

We are firm believers in large exhibits whenever possible. Of course we cannot always stage 40 x 40 foot ones -- but, in our opinion, it is advisable to have a few sawlog-sized specimens at all exhibits, if but a four foot section. Reproduction size is not nearly so impressive as a specimen from a twelve inch tree.

Without doubt large exhibits attract the most people -- thirty-five foot trees growing where there was a bare spot the day before is bound to attract the forestry minded. Thousands are attracted, spending far more time looking things over, asking far more questions, and showing far more interest than if a two by four exhibit is on display. People representing your own State as well as other States will be attracted. How many times will this remark be made "I have heard of white pine blister rust and thought I knew what it looked like. I was wrong, but this exhibit has shown me more in five minutes than I could learn from reading all your booklets and pamphlets. Everybody should see this exhibit, it surely tells the story. I never had an idea that the disease was doing so much damage."

Perhaps the greatest value derived from large tree exhibits is that we reach the timberland owner and pine planter. The former is seeing trees that represent a sale value and the latter, something that is going to cause him to protect his investments.

Discussion:

Mr. Bradder (Vt.) spoke of his work with school children and Boy Scouts. He has found teachers willing to distribute circulars to the children and even to allow him to talk to children regarding blister rust. In some instances, a public spirited citizen has offered a prize for the scholar who destroyed the most currant and gooseberry bushes which were growing near white pine. In one of these contests, one girl pulled over four hundred currant bushes. Interest created in this way often leads to further cooperation from the parents of the children.

METHODS TO ENCOURAGE PINE PRODUCTION AND TO SECURE APPLICATION OF CONTROL

By Roy G. Pierce, Associate Pathologist, Division of Blister Rust Control.

An analysis of figures for tree distribution from State nurseries for 9 States including New England, (except Rhode Island) New York, Pennsylvania, Michigan and Wisconsin has been made for the past 5 years, i.e. from 1926 to and including 1930. This analysis shows that in Maine, Vermont,

Connecticut, Michigan and Wisconsin there was less white pine planted in 1930 in proportion to the total number of trees distributed that year than in the preceding 4 years, the 4 year period being figured as a unit. In Pennsylvania the proportion of white pine to total distribution in 1930 is practically the same as for the preceding 4 year period. Only in New Hampshire, New York and Pennsylvania has white pine distribution increased in 1930, figured on a percentage basis. It would seem advisable at least in those States where white pine planting is on the decrease to study the data on blister rust control with the idea of presenting a picture that Protection from Blister Rust Pays.

Certain States as Connecticut, New Jersey, New York and Pennsylvania have recently issued bulletins concerning the progress of control of blister rust. This is along the right line and should be followed in the other States as soon as practicable, particularly in New England where the work has been carried on the longest and where it has been so successful. The bulletin or circular receives wide publicity if there is a large edition and continues to be of value for years after its completion where provision was made for a surplus over the first year's needs. The educational value of a publication is continuous where the bulletin is sent to such institutions as libraries, high school botany departments, forestry committees of women's clubs, boy scout troops, and permanent camps for children.

To secure an increase in the percentage of white pine planted it would seem essential to have the backing of the State Forestry Department. If the foresters in the State have not been "sold" to the idea that white pine is one of the best trees to plant, this would seem to be one of the first things to do, i.e. to get their backing. Personally conducted trips for the foresters to various places in the State where the value of control methods can be presented would be desirable. Data on cost and feasibility of control should be gathered for use not only for the foresters but for others contacted.

An idea which was presented some years ago at a blister rust conference and which has met with marked success in the case of Barberry Eradication, is that of the lesson plan for grammar and high schools. Only 2 of the Eastern States Minnesota and New York which are infested with the blister rust have followed the lead of the "Barberrians." An appraisal this early of the lesson plan in these 2 States is impossible but I feel that there is a tangible value which will have an effect in the State after the children become of age. Something similar was prepared by Agent Richardson sometime ago entitled "Answers to Questions Often Asked Regarding White-Pine Blister Rust Control." I am not sure whether or not these were distributed to the schools. I believe, however, they were intended for an adult audience. In connection or as a substitute for lesson plans for schools would be the inclusion of blister rust control as one item of study in the nature study or botany courses taken by the teachers at their training colleges and at teachers' institutes if these are still held. Lectures at the teachers colleges or at the teachers institutes by the State blister rust control leader or by some of his agents might well supplement the study of blister rust control.

In parts of certain States, as Rhode Island, Connecticut and Massachusetts, there is a splendid opportunity for encouraging the production of white pine, that is in those regions where Ribes are absent or very scarce. This is true not only for some New England States but also for portions of the States south of Pennsylvania where native Ribes are not found at low altitudes. As far as I know little publicity has been given to the matter of Ribes-free areas which may be adapted to white pine growing. Care must of course be taken not to give the idea that pines cannot be planted with success in areas where Ribes are present.

The data charts or boards used at demonstrations for which New Hampshire was famous a few years ago, should be revived. These offer a type of display suitable for permanent demonstration areas. They may present such facts as cost of blister rust control, the increase in pine value where protected, the feasibility of control work - the benefits accruing both to owner and community, etc. These sign boards are the result of careful study of facts and are concrete in their figures. If you are not already familiar with the New Hampshire outdoor blister rust sign boards we can send you photographs of them from the Washington Office. I believe we should not stress the amount of damage caused by the rust as much as we should emphasize the feasibility and value of the protection. Healthy pine is our aim and goal. Sometimes we have seemed to gloat over an infected stand as a doctor might over an interesting case. News items for daily or weekly papers or the Farm Bureau monthly papers will always be found of great value. From the number of this type of news items which have not been received in the Washington Office this year it would seem that this means of carrying on educational work has been greatly neglected. I realize, however, that Mr. Filler's report of educational work will probably show a large number of news items published but the Washington Office failed to receive them.

From reports compiled in the Department of Agriculture in Washington, the radio seems to be rapidly increasing in value as a means of getting across educational work. It might be advisable for our agents to make more use of this means than they have heretofore.

There is probably a need for educational lantern slides of photographs taken in each State featuring particularly protected stands. As far as possible these photographs should be taken of stands where the blister rust history is known. When such slides are presented they are of distinct educational value when certain details are known concerning the beginning of blister rust in the stand, the extent of the disease, the number of Ribes taken, and the fact that no rust or little rust has occurred since eradication some 8 or 10 years previous, etc.

Discussion:

During the discussion after the presentation of the paper, Mr. Pierce emphasized the fact that radio talks given by the department men must be approved in Washington before they are presented. This must be

done to guard against incorrect statements being made regarding Government work. Mr. Mandenberg stated that radio talks are often called for on short notice. Mr. Pierce suggested that the radio talks be prepared and approved in advance so that they will be ready when called for.

DETERMINING THE EXTENT OF THE BLISTER RUST PROBLEM IN THE LAKE STATES.

H. N. Putnam, Federal Supervisor, Lake States.

I. Introduction.

A large portion of the land in the upper two-thirds of Michigan, Wisconsin and Minnesota is permanent forest land best suited to forest tree growth. In "Logging Practice in the Lake States" 1928, Zon shows that there are roughly 57,100,000 acres of permanent forest land in this region, as large as all of New England, New York and one-third of Pennsylvania. Much of this vast area once supported very excellent stands of white pine. In 1922 it was estimated that 17.7% or 10,100,000 acres of the forested area supported old merchantable timber; 46.4% or 26,500,000 second growth and 35.9% or 20,500,000 acres non-restocking and unproductive. Roughly 75% of the area is in large ownership, either private or public and 25% in woodlots.

II. Purpose.

The pressing immediate need in the Lake States is to find out the location and extent of white pine areas and white pine planting sites, and data on Ribes conditions thereon. Information of this nature is of unquestioned necessity in building a constructive and intelligent program of control. One of our first jobs in the Inland Empire was to make such a survey, and the results have been extremely valuable.

III. Information at Hand.

From the cartographical survey made in 1927 and 1928, we have the following estimates of white pine acreage in the three Lake States:

State	Acreage of White Pine of 20% or more of Stand.			
	Pure Pine (80% or more)	Mixed Pine (20-79%)	Pine restocking in types other than pine	Total
Mich.	28,321	685,789	122,769	836,879
Wis.	11,127	109,756	Negligible	120,883
Minn.	173,092	266,812	170,524	610,428
Total	212,540	1,062,357	293,293	1,568,190

Considering the amount of data taken in a comparatively short time, the cartographical survey was very much worth while. It forms a basis for getting more exact information. Necessarily it would not be extremely accurate. I believe it errs on the side of underestimation rather than overestimation. For instance, there is shown in Wisconsin a total of 11,127 acres of pure pine. On the Menominee Indian Reservation in Wisconsin alone they have a known total of 11,425 acres of pure white pine, mature.

In further regard to the Menominee Indian Reservation lands, Mr. Grapp, Forester, reported that they had about 24,500 acres of mature white pine of all types with an estimated volume of 50 million board feet. On one forty acres alone they found 1 1/2 million board feet, an average of nearly 40 thousand board feet per acre. One prize white pine measured 72" D.B.H and ten 16' logs high. There is a very low percent cull in their white pine logs. The Indian Service is operating on a deferred cutting system, cutting to a lower diameter limit of 18" D.B.H. and leaving seed trees. They expect to come back in about 35 years and take the seed trees and are hoping to find white pine reproduction.

IV. Inventorial Work.

In continuing the work started by the cartographical survey, in determining the extent of the job in the Lake States, the work can be divided into two phases as follows:

(1) Pine location survey, in which the principal emphasis is placed on location and extent of white pine and white pine planting sites.

(2) Preeradication survey, in which emphasis is placed on finding out the Ribes conditions and eradication costs upon pine lands already located. These two types of work can be considered separately.

A. Pine Location Survey

Energy will be devoted this fall and winter to assembling from all known sources of information on locations and extent of white pine. Such sources , information include the cartographical survey, Land Economic Survey, Forest Service records, State records, etc. Data will be mapped and summarized by acres, on county units.

Data relative to location and extent of white pine and white pine planting sites will be assembled in the field in connection with cultivated black currant eradication work and scouting for the rust. Such work has already been done in Michigan in both the Upper and Lower Peninsulas. For example, let us take Oceana County which Thompson worked for cultivated black currants this summer. He covered every road and mapped on township maps 1 inch to the mile all pine stands divided into two groups:

(1) Worth protecting and (2) Too scattered to protect.

He found a total of 770 acres worthy of protection and 10,596 acres of scattered pine. When we can assemble from all the pine-growing

counties in the Lake States information like that obtained in Oceana County, with the addition of estimates on planting sites, we will begin to have a firm basis on which to build a constructive control program.

B. Preeradication Survey.

Preeradication surveys or surveys to determine the Ribes conditions and costs and methods of control done before eradication, as the name implies, will be carried on before actual eradication work is undertaken.

In order to make broader use of data obtained on Ribes conditions certain Ribes types have been devised. It is hoped that these types may be sufficiently distinct to be recognized and to be typical and sufficiently broad to cover conditions encountered. The types are shown in the following table.

UNIFORM RIBES TYPES, LAKE STATES REGION.

Ribes type	Character	Ribes abundance
Swamp type Cedar-Hardwoods	Water nearly still, loamy soil, deep humus, much brush, mosquitoes, windfalls, Cedar-Hardwoods-White Pine	Heavy
Swamp type Alder	Water flowing, much deciduous brush, Alder, Maple, Willow	Heavy
Swamp type Tamarack-Black Spruce	Water still, sphagnum, blueberries, pear, brush medium. Often dense stands Tamarack, Spruce, some white pine and birch.	Few to medium depending on timber density.
Swamp type Muskeg	Water still, deep peat, dense growth leather leaf, moss, scattered dwarf black spruce.	None except in edges.
Upland type Mixed hardwoods.	Dry land, medium duff, sandy loam to clay loam, good soils, brush medium. Mixed hdwds. white pine, often aspen, birch, white pine. Constitute good pine planting sites.	None to medium.
Upland type pasture	Dry land, open fields, scattered brush, soils vary. Scattered hdwds. white pine.	None to medium. Often large bushes.
Upland type pine	Dry land, sand to sandy loam, brush light. Jack pine, Norway pine, white pine.	None to few.

If we can succeed in developing Ribes types such that each one represents within a certain range the same approximate working method and cost, our work of evaluating a given protection job will be speeded up and simplified.

We expect to analyze our protection jobs already done with end in view of classifying them so far as possible into Ribes types and finding out the costs per acre thereon.

We can also individually perform experimental eradication in each type by walking through a type and pulling Ribes on a strip of uniform width and paced length. The length of time taken on the portion of an acre covered can be easily converted into hours per acre to pull so many Ribes in such and such a type. Accumulated data such as these will materially assist us in judging the costs of a given job.

We have made some actual preeradication surveys this summer, notably on the Ottawa National Forest in Michigan, certain state lands in Michigan, on the Menominee Indian Reservation in Wisconsin and Chippewa National Forest in Minnesota. Methods varied widely but they all had the same objective, that of obtaining an estimate of the given protection job, where the Ribes were located and the general protection program needed.

We have been called upon to go over prospective planting sites, notably on Forest Service lands in Michigan and in some cases found them to be Ribes-free.

The Land Economic Survey, as performed in the Lake States, offers an excellent opportunity to obtain valuable data relative to Ribes at a minimum effort on our part. The Land Economic Survey gets information concerning the location and extent of timber types, composition and density of stand, its age class, soil types, origin of soil, game cover, flow and clearness of streams, etc. The work is considered in two parts:

(1) Typing, usually done by men going twice through a section; and

(2) Sample plots, on township lines and once through each township both ways. Tenth acre sample plots are put in at specified distances. Trees are counted by species and diameters; growth measurements are taken, principal brush species and brush densities are recorded.

By cooperating with the Land Economic Survey in both types of work, we can obtain a general statement of abundance of Ribes in the typing and an actual count on the plots. The L.E.S. has expressed a willingness to cooperate with us in each of the Lake States.

Preeradication is essentially an advance scouting job adapted to large ownership. In the U.S.D.A. Yearbook for 1922 it is stated that approximately 75% of the forested area in the northern hardwoods-coniferous region of the Lake States is in large ownership, either public or private.

To sum up, in the Lake States we need information on the location and extent of white pine types, both present and potential, and Ribes conditions thereon. We must develop a systematic, accurate and rapid method of obtaining this information. We expect to have a get-together of the Lake States workers this fall to see where we stand in this matter, to coordinate our efforts and make plans for the future.

PINE CLASSIFICATION IN NEW YORK

By H. L. McIntyre, Supervisor, Forest Pest Control, New York

There is a feature in connection with our work in New York that might be called a new plan of control. It is at least comparatively new in New York. It has to do with obtaining forest type data before blister rust work is undertaken in a town. We usually refer to the latter as type mapping.

A second feature is proper use of these type maps in our field work. The forest type data are obtained by making a complete canvas of a town. Every road is covered. The type and approximate boundary of the timber lots are noted by colors on the U.S.G.S. sheets. These data are later transferred to tracing cloth, from which can be made up any number of prints desired. Only two colors are used to designate growth species in the mapping work. A definite color is used for white pine, while all other varieties are included with a single separate color. When transferring these data to tracings, a symbol, such as the letter "T" represents white pine, the other varieties being denoted by a series of dashes.

When control work is undertaken in a certain town, a type map of the town is furnished the worker. His duty is to inspect every pine stand, his map serving as a guide on where the different lots are located. It was through the use of these type maps that classification of the stands originated. It so happens that Ulster County was one of the first sections where type mapping work was completed and where, until that time, white pine was supposed to be very limited. The maps, however, gave a different picture. Generally speaking, the lots are small but much more numerous than one would consider them in connection with the usual blister rust survey.

In 1930 a complete set of Ulster County maps was turned over to H. G. Strait, Blister Rust Agent in that district, with instructions to get a report of the condition on every white pine lot, regardless of whether or not the owners cooperated in blister rust control work. Very shortly Strait recommended the classification method, which after due consideration was given a trial, resulting in its continuance and extension to other districts.

Our classification system is readily understood by the average field man. We have three groups, one, two and three respectively. Number 1 is the mature or middle-age stand with a complete ground cover, with no chance for reproduction, in which case we consider the area automatically protected from commercial damage by blister rust. Number 2 is the young stand, or a more mature one where the canopy is broken and chance for reproduction is evident. In such cases Ribes bushes around the openings are destroyed, also establishment of a protective border or other measures essential to protect the young stand is undertaken. Number 3 is a mixture of white pine and other coniferous or deciduous species, the latter predominating, or pasture pine with no chance for the white pine to reproduce. In all instances, the classification is

noted on cards, also on the town map. Thus a quite permanent record of the condition is available.

It is difficult to understand why considerably more attention should be focused on a certain project in one community than in another. Warren County, it seems, stands out rather prominently in this classification method, why - I hardly know. The work there has been limited practically to one town. The system used has been practiced in covering almost all of Ulster County, in which we find there are some sixteen towns, also practiced in Fulton, Hamilton, Montgomery, St. Lawrence, Columbia and Greene counties. Possibly we may credit the prominence of the Warren County work to visits of prominent personages from the field of blister rust, good publicity and the enthusiasm and aggressiveness of Winfield S. Codman, who directed the work.

While quite a lot can be said in favor of our classification method, it is not without its disadvantages, but in spite of any criticisms that can be offered we believe adequate protection from blister rust has been extended to the areas where the method has been practiced.

In order to classify any lot, it must be covered carefully enough to determine the general make-up of the stand. The prominent factors to be noted are age, openings and Ribes prevalence. When the reconnaissance of the stands has been completed, the blister rust worker should be able to give definite information on the part or parts of the stand that need or do not need protection from blister rust. Here, then, is one of the credits for the system. The blister rust worker can give the lot owner quite reliable information on conditions, cost of protection, etc. The latter is usually willing to listen when he discovers that the entire lot will not need to be covered, foot by foot, at a cost considered prohibitive by him. We have, at least during the past season, covered a good many areas that would not have been covered, except for the inducement offered by the classification system.

Another of the prominent points in favor of this plan is that the blister rust worker is actually spending his time in protecting certain parcels of white pine, or in acquiring pertinent facts concerning eradication needs. This time, previous to the adoption of the classification method, was spent in interview and follow-up calls, in useless attempts to induce the lot owner to protect his holdings from blister rust. Still another credit can be mentioned. We have confirmed our belief that our Ribes population is quite heavy, but have learned that it is much more localized than heretofore believed. In the past, we have approached the white pine owner with too limited a knowledge of the true Ribes condition on his property. The Ribes prevalence over the entire lot has usually been rated with a localized condition (possibly a bad one) known to the interviewer, which discourages the land-owner's cooperation.

The disadvantages that so far have come to our attention are primarily three-fold. First, a worker who is backward about making interviews will sometimes evade an interview with the landowner and attempt to protect the area himself, on which crew work for proper protection is imperative, which results in a very low grade type of work. Second, we have found white pine stands rated in the No. 1 Class, that belonged in the No. 2 grade. The worker's excuse for improper classification in such instances has usually been that he failed to note possibilities for reseeding or a small stand of young pine; hence improper classification and a future stand of white pine left unprotected. Third, a uniform system of classification cannot in New York be applied on a State-wide basis. For example, in 75 per cent of the white pine counties, we find wherever conditions permit, a wonderful reproduction of white pine. Thus many mature or nominally considered Class 1 areas, due to reseeding possibilities, must be graded in the No. 2 class. In St. Lawrence County the condition is just the reverse. We find scarcely any reproduction. There are plenty of parent stands that have been old enough to bear a seed crop for twenty years or more. The surroundings of these stands seem to offer reproducing facilities equal to those found in the other counties, but for some reason the white pine is not reseeding. We consider the reseeding a very important factor in the classification method.

In concluding, the writer would like to call to the attention of those interested in this classification method, that we must not overlook that Ribes are host plants of white pine blister rust and, while we believe that adequate protection has been offered all areas covered under the system in New York, we certainly are convinced that the work must be covered by a reliable, competent, well-trained man, one who will not change a classification for his own benefit or that of the land-owner. In addition, we find that work of this type needs considerable checking and surely increases the responsibilities and duties of a blister rust agent. Further, we feel that for fear of inducing the white pine owners to feel that responsibility for blister rust control rests entirely on the shoulders of State and Federal agencies, caution should be the guide of any agency adopting the classification method in connection with white pine blister rust control.

A SYSTEM OF PINE LAND CLASSIFICATION AND ITS USE IN COOPERATIVE CONTROL WORK IN NEW YORK

By A.E. Fivaz, Forester, Division of Blister Rust Control.

Pine land classification, in some form or other but usually not designated as classification, has been in use by blister rust control workers since before the cooperative control program began. One of the early forms of pine land classification was based on Ribes conditions and was developed by Mr. L. W. Hodgkins. This was called advance scouting and is still in general use today. Its purpose is to separate pine land into

two classes, that were Ribes can most efficiently be located and removed by a crew and that where Ribes are absent or can be efficiently located and removed by an individual, which is forthwith done by the scout. Another form of pine land classification, based on pine conditions, had long been applied by the control agent. This constitutes the separation of pine worth protecting from pine not worth protecting.

The purpose of all pine land classification in our control work has been and still is to reduce to a minimum commensurate with economic safety the area from which Ribes must be eradicated, and hence the cost of doing this work. Observations and investigations made by control agents and other workers have gradually increased our knowledge of the interrelationships of blister rust and its two hosts, so that certain refinements in the classification of pine land can safely be applied.

A system of pine land classification embodying these refinements has been devised and used this season under the leadership of Mr. H. L. McIntyre, State Leader. In preparing the pine land classification system outlined on the mimeographed sheets that have been distributed to you, I have adopted the classes devised and used by the control organization in New York State, and have merely defined them and provided a method for their identification. Two methods, in fact, for both the key and the list forms of classification have been drawn up so that the individual may select the form easier for him to understand and assimilate.

This pine classification takes into consideration three factors. First, it considers the value of white pine in forest stands for timber, scenic, and other purposes. Exposition of this factor is not within my province, but Professor R. C. Hawley of Yale Forest School is expected to be here and can undoubtedly give you sound information on this subject. Second, it considers the period required by the blister rust to cause commercial damage in pine stands at various stages in the forest rotation. This is a pathological factor, and Dr. Perley Spaulding of the Division of Forest Pathology is here and will probably discuss it. I have arbitrarily assumed that submature stands of northern white pine within 20 years of clear-cutting, under Eastern conditions, will not be commercially damaged by the blister rust. Third, this classification considers the influence of coniferous shade on Ribes, a Ribes-ecology problem in which I am primarily interested. Observations and experiments indicate that conditions in the Eastern States within dense and pure coniferous stands having closed and unbroken crown canopies normally prevent the attainment of dangerous size by such Ribes as may be present therein.

Pine classification has two uses. First, it is applied by the control agent as an aid in obtaining a closer estimate of the cost of control work in order to permit the most favorable proposition to be made to the owner when seeking his cooperation. Second, it is applied by the eradication scout in limiting the pine area which should be protected to the minimum commensurate with safety, based on our present knowledge.

During the past season this system of pine classification has been successfully used in the Town of Chester, New York, by Agent W. S.

Codman. In this state, the state foremen are used also as eradication scouts. The typical procedure used by Mr. Codman for the accomplishment of cooperative control work among individual pine owners is about as follows.

The agent determines the location, extent and boundaries of the pine lot as best he can; and then he makes a gridiron cruise of it, observing the prevalence and distribution of Ribes as well as the extent of the various classes of pine land. Almost every pine lot is made up of several classes of pine land, the pine varying as to density, age, health, admixture of other species, usefulness, etc. As a result of his cruise through the pine lot the agent obtains information on the proportion of the area which can be eliminated entirely, the proportion which can readily be worked by the scout eradication method, and the proportion and nature of that which will require crew work. On the basis of this information the agent can decide what size of crew is best fitted for the work and estimate with reasonable accuracy the number of crew days which will be required to protect the pine on the lot. He then approaches the owner with a proposition something like this:

"You have____acres of pine land that I have looked over thoroughly this morning. About ___ acres of it, because of the age and the character of the pine, need no blister rust protection, but ____acres do need the protection afforded by the removal of currants and gooseberries. The state foreman can work ___ acres of this alone and without cost to you, but he will need the help of ___ men for ____ days in order to work the rest of your lot. Will you do your share of this work?"

Where substantial parts of the pine lot fall into Class I and Class IA pine, or where substantial parts of the Class II pine and necessary protective strips can be adequately protected by the state foremen alone, this proposition is a beneficial one for the owner. While this division of the burden of the control work between the state and the owner is not new, the means of expressing it to the owner so that the proposition sounds as attractive as it really is, are novel.

Note especially that this proposal reverses the usual order of appeal to the pine owner. The usual proposition is a promise that the state will aid the owner to do the work, implying that the burden will be borne largely by the state. The proposal is attractive also because the request is for a definite amount of help based on expert reconnaissance. Psychologically it is probably the soundest approach devised so far for securing a favorable reply from the pine owner.

If the owner agrees to furnish the necessary help, the pine lot is turned over to a state foreman, who, for the present, has no crew and works alone as an eradication scout. Instead of directing his search for likely Ribes sites solely on the basis of topographic features or along random lines, he actually works contiguous but wide strips systematically across the entire lot, except in those parts where crew work

is needed or where no eradication is required because of the class of pine. He marks not the edge but the center of his strips, impaling pieces of trail paper on twigs in such a position that they will be visible from the next parallel strip a considerable distance away. Thus his scouting really makes a gridiron pattern over the entire lot, except for side trips for the purpose of investigating and cleaning up, or locating for crew work, likely Ribes sites which may lie between his main parallel lines. The distance between the main parallel lines is determined by the distance at which he can see his paper markers, varying from 150 feet upward. As the foreman proceeds along his strips he makes a sketch map of the lot showing the boundaries of the area needing crew work for his own subsequent use, and showing also the boundaries of the various classes of pine land, the area he alone has freed of dangerous Ribes for the administrative use of his superiors; he eliminates from the present eradication work the Class IA pine and all parts of Class IA or II pine; and he frees of dangerous Ribes as much of the Class II pine and the protective strips around Class IA and II pine as he can efficiently cover alone.

When the foreman has finished his scout work on the lot, he secures the crew promised by the owner and completes the job by directing the crew over those areas designated as needing crew work.

In the administrative check of the work done by the foreman, special attention must be directed to the advisability of checking on the foreman's judgment in classifying the pine, as well as to his efficiency in locating and completely eradicating dangerous Ribes. For this work the checker will have use for the sketch map prepared by the foreman, which may then be filed by the Agent in charge of the district as an aid in planning timely reeradication work on the tract.

Discussion

Mr. Riley (Connecticut) commented upon the complexity of the key prepared by Mr. Fivaz, although acknowledging the fact that the key is most comprehensive and foolproof. Mr. Riley carefully explained the simplification that had been made in the classification, and proceeded to describe the sample units that had been layed out in the field for the information of and inspection by the conferees. Brief comments were also made by Codman (New York), Fivaz and Filler.

Further discussion of this subject occurred during the field trip to the Scoville and Miles areas near Lakeville. Riley mentioned that the primary object of the trip was to demonstrate a classification of white pine stands on the basis of necessary blister rust control treatment. He pointed out that a classification of this kind is most useful in sections where white pine exists in large blocks or in small isolated units. In this section of Connecticut, the various pine types are so intermingled and of such small size that the advantages of classification are less pronounced. Frequently, the protective zones, surrounding the pine types needing protection, largely or entirely overlap those types not needing protection, thus necessitating an eradication of Ribes

throughout the entire area. Riley further stated that the New York pine classification had been used as a basis for classifying the pine stands on the areas inspected, and that particular emphasis had been given to the designation of pine stands which required no protection or protection zones only. The conferees were furnished with statements describing the classification and the areas visited. It was generally agreed that the field trip was unusually interesting and instructive.

PREERADICATION SCOUTING - STOP, LOOK, AND LISTEN!

By Perley Spaulding, Senior Pathologist, Northeastern Forest Experiment Station.

Ever since the idea of preeradication scouting has developed and been practiced there has been a question in my mind as to how far it could be trusted in the long run. I could understand that it might be quite feasible in southern New England and in corresponding sections of New York because of the almost total absence of wild Ribes except on rocky ridges or in limited swampy patches. As a means of estimating the cost of eradicating Ribes over a certain area it appeals to me as a valuable tool. But I believe we are treading dangerous ground if it is used generally as an actual eradication measure. I am afraid there is a distinct tendency to use it too freely for absolute safety. My personal reaction to it is to use it cautiously and with great discretion; be safe rather than sorry later.

Over 90 per cent of all fires and all accidents are due to plain carelessness. I have watched the blister rust from its first discovery here, and have personally observed it in the Northeast and in the Northwest, as well as in Europe. In each of these regions its history has been the same; there has been at least one huge, explosive outburst of terrific intensity and distribution. The spores have flown to long distances and have started new outbreaks. The blister rust work has an enviable record for efficiency and effectiveness in spite of some mistakes which were made in the beginning. Let's not cut the corner too closely at this late day when we should know better.

There is no doubt in my mind that the eradication work in the Northeast has greatly retarded the progress and intensity of the disease. Even yet it has not reached its climax here. Past experience shows that once in a considerable number of years the weather is so favorable for the blister rust that it acts like a huge forest fire, fairly exploding in intensity and springing up far beyond previously known bounds. This is the thing that I have in mind in urging caution. Under such circumstances scattering Ribes do commercial damage, although under usual conditions they do not.

I understand the temptation to adopt short cuts in order to get cooperation, especially under present conditions. Now is our danger period. Don't sacrifice thoroughness beyond the point where you feel

confident that extreme outbreak conditions are safely allowed for. They surely will come and if our work stands the test then we can pat ourselves on the back - and work still harder.

Discussion:

Mr. Newman (N.H.) inquired whether there is usually much infection on eastern Ribes lacustre.

Dr. Spaulding (Mass.) replied that he finds scattering leaves infected, but it is not a very susceptible variety. In the West, the species was first believed to be immune, but it is now doing considerable damage. He believes that it has been the general experience in the East that this summer has been very favorable for rusts of all sorts; 1931 will be one of those dangerous years.

Mr. Posey (D. C.) reported that lacustre produces considerable telia early in the season and forms concentrations of the rust on pine. Heavy damage results from this species.

Dr. Boyce (Conn.) pointed out that this is an excellent example of damaging power as contrasted with susceptibility. The species has a considerable measure of damaging power, although it is not particularly susceptible.

Mr. Riley (Conn.) found that of the thousands of Ribes pulled this year, infection was generally very heavy. On R. cynosbati it was especially heavy on all the leaves except those put out as secondary growth. Infection was the lightest on R. americanum.

Mr. Hurford (R. I.) commented that in Rhode Island infection was very light this year, even on R. nigrum.

Mr. Fivaz (D. C.) also found infection very light in the North Hudson area in New York.

Dr. Spaulding (Mass.) believes that in spite of favorable rainfall conditions generally, there were some places where a drought was suffered. This may explain the light infection in some instances.

THE BLACK CURRANT ERADICATION PROJECT IN RHODE ISLAND.

By A. W. Hurford, State Blister Rust Control Leader, Rhode Island.

A general Ribes eradication program carried on since 1917 was practically completed at the end of 1928 in the most important white pine areas of Rhode Island. Rechecking for wild and cultivated Ribes in areas not scouted since the early years of the work was needed after the completion of the initial Ribes eradication, but a more important problem

was thought to exist at that time. That problem was the presence of many European black currant plantations throughout the state allowing the existence of local centers of blister rust infection outside the more important white pine districts. The State Commissioner of Agriculture in the spring of 1928, under authority of law, declared the European black currant a public nuisance and its possession illegal. To allow the European black currant to grow in the state for any length of time after condemning it was thought unwise, since the lack of prompt regulatory work would weaken public support. Also the sooner black currants were eradicated the quicker effective control of blister rust would come about. The blister rust control agent located and had destroyed 127 black currant bushes in four different townships during 1928. However, it was not until the spring of 1929 that the state crew, varying from three to four men, commenced work on this project.

A vigorous educational campaign was started after the black currant regulation was in effect. Literature and posters were printed, fair and window demonstrations were placed and all the publicity possible was given through press releases, talks and other contacts.

At the end of 1930, 9,760 European black currant bushes had been found and destroyed in over 810 plantings located in 35 towns and cities of the state. The state crew inspected over 47,841 properties and traveled over 16,889 miles in carrying on the work. The black currant eradication project was retarded to quite an extent this season since the state scouts assisted in a survey of blister rust infection in white pine plantations for a period of between two and three months. However, up to October 19, 4,240 European black currant bushes have been found and destroyed in 415 plantations located in nine towns and cities. In carrying on this season's work the men have inspected 17,196 properties and have traveled 2,993 miles in the state truck. Since black currant eradication was started as a special project and up to the present time, 14,000 European black currant bushes, located in over 1,225 plantings, have been found and destroyed in 37 towns and cities. Over 65,037 properties have been inspected and over 19,882 miles have been covered. Only the cities of Central Falls and Providence, including sections of adjacent towns and cities considered as in the greater Providence area, remain to be scouted. The work needed to complete the project after the end of this year will be gradually carried on in conjunction with rechecking in white pine areas. Plans are being made to continue black currant scouting next year on Saturday mornings and during inclement weather.

You are probably more interested in procedure than in the detailed summary just given. In scouting rural districts the foreman directed two or three scouts in inspecting one or more properties at the same time, according to area and conditions. Attention was given to inspecting near old cellar holes, abandoned gardens and similar places as well as sites where cultivated Ribes might be more likely to grow at the present time. The use of a state truck eliminated long walks between properties and saved much time and effort. In scouting built up sections the foreman assigned one man to each side of a street, scouting the suspicious and unusual sites himself, as well as supervising, interviewing

and recording data as the work proceeded. Whenever possible the foreman personally interviewed all owners of European black currants. His value as a contact man was of the greatest importance. The state law and regulations do not provide for compensation to be given to owners of European black currants. Upon finding black currants, each owner is presented with a cultivated black currant eradication notice by the foreman. The wording of this notice is such that few owners have even questioned about compensation and none have made an appeal to state officials above the blister rust control agent. A numbered card record was kept of all European black currants found and destroyed, showing ownership, number and quality of the bushes as well as other data. A map record was also kept and each card number was recorded on the map to show location. This allowed a record of planting sites for future use. Each town and city was worked systematically although some attention was given to the nearness of white pine as sections of certain towns and cities near valuable white pine stands were scouted first. When black currant bushes were found they were generally pulled up out of the ground with the aid of one or more adz. The adz proved to be the most practical tool for the purpose. Most of the bushes were taken in the truck to town and city dumps and burned within a short time. It is impossible in a short paper to report in detail on procedure. There is one other point though, which is worth bringing to your attention. American black currants growing under cultivation were not destroyed outside the white pine blister rust control areas along with European black currants unless the owners so wished it. The difference between these two bushes was carefully explained. It appears that eradication of the American black currant in a so-called black currant project is apt to allow much confusion in the minds of the owners because American black currants are allowed to be planted anywhere outside the white pine blister rust control areas at any time with a permit. Also, of course, American black currants should be treated as other less dangerous cultivated Ribes, as provided for under the state policy.

In the carrying on of the project many interesting problems were met and solved. Important contacts were made which afterwards developed into better individual cooperation and increased moral support of the program. It was found wise when scouting a district where the work was little known to find and eradicate bushes owned by the most influential citizens when this did not change the systematic method of inspection. In giving cooperation people were apt to follow in the footsteps of the local leader. If the foreman could say that a certain party of prominence had had his or her bushes destroyed little trouble was experienced in destroying the remaining bushes in the vicinity. This policy soon indicated to people in various sections of Rhode Island that all black-currant owners were to be treated alike regardless of political or social prominence. Comparatively few complaints were made at any time and all were satisfactorily handled with mutual understanding. Firmness with due consideration to the property owner's rights was the policy. Once people had their bushes destroyed it was found that they were glad to tell where other bushes could be located. Many times people telephoned to other black currant owners and advised them to destroy their bushes before the state scouts appeared. It is impossible to determine how many black currant bushes in Rhode Island have been destroyed as a result

of the educational program and the individual cooperation of various people. The project, being state-wide, acquainted more people with blister rust control than has been possible through past work carried on chiefly in the white pine districts. This should result in better public cooperation in the future.

We speak of black currant eradication, but it is very probable that the black currant will not be entirely eradicated in the state. All sections, of course, have not been scouted at once. There has been some opportunity for people to plant bushes received from sections which still remained to be scouted. A few such cases have been discovered. Also, even though great effort was made to destroy all bushes including their entire root systems, it is humanly impossible to have perfection. I am satisfied, however, that when the project is completed Rhode Island will be sufficiently free from the black currant menace to insure the protection of white pine because the chief local centers of infection have been eliminated and the long distance spread of the disease has been greatly reduced.

The infection found on European black currants has certainly indicated the need for the project. Considering only the period when blister rust is discernible on the Ribes leaves, in 1929 eighty-six per cent of the bushes and eighty-seven per cent of the plantings were found infected; in 1930 seventy per cent of the bushes and fifty-nine per cent of the plantings were found infected; in 1931 seventy-two per cent of the bushes and fifty-eight per cent of the plantings were found infected; the average for these three years being seventy-six per cent of the bushes and seventy-eight per cent of the plantings infected. It should be understood that all infection does not appear at once and therefore percentages would be much higher if all bushes were inspected at a time when blister rust is most apparent. Several pine infection areas have been discovered while on the project. These have furnished fresh proof of the black currant menace.

The development of state-wide forestry interest has been the most important step in obtaining cooperation in blister rust control. As people have shown a greater appreciation of trees they have become more interested in protecting them. The public appears very much interested in the white pine. The control of any tree disease depending upon public cooperation will not be effective unless the public understands it as an important step in the state's forestry program. That fact has been stressed throughout our project. I feel that the two most important points determining success or failure in a black currant eradication project are, first, to have a good contact man as foreman, and second, an effective and continued educational program stressing forestry and blister rust control as part of a forest protection policy. The State Regent of the Daughters of the American Revolution mentioned to me recently in discussing state forestry activities that she was much interested in the black currant project from the standpoint of protecting white pine. This being my first contact with her it was pleasing to observe that our educational program had been effective. This is but one of many similar statements.

In closing I desire to stress that crew morale is very important. The fact that our men have taken pride in their work has been brought to my attention quite a few times. The State Executive of the Boy Scouts informed me this summer while the men were working at the State Boy Scout Camp, that more interest was shown than one generally expects to find with ordinary labor.

I realize that the Rhode Island project cannot compare with similar ones undertaken in larger states and possibly this paper can be of little aid to those agents who have undertaken larger programs. It may have value, however, to those who will supervise black currant projects later. We have had to deal with a population larger than that of either Vermont or New Hampshire, made up of many nationalities. One of our crew men speaks French, another Italian, and I might suggest that it is worth while to hire labor with consideration of the type of people you are dealing with.

Discussion

Hurford (R.I.) inquired regarding the prevention of cultivated Ribes replacement in control areas.

Perry (Mass.) stated that control areas in five towns in Massachusetts had been rechecked during the 1931 season and some replanting was found. He estimated that the number of replanted Ribes amounted to about 5% of the number initially removed. The replanting did not seem to be willful, but resulted more from an influx of persons not living in these towns when the original work was in progress. In most instances the owners were not aware of the fact that they were in control areas. Mr. Perry emphasized the point that the control-area-permit provision of the Federal quarantine had been instrumental in preventing a greater replanting of Ribes, and recommended that this provision be permanently retained in the quarantine.

DESCRIPTION OF A METHOD OF "CLOSED SCOUTING"

By J. W. Charlton, Agent, New York

It has been recognized for some time that protection, at a greater saving of time and money, may be given many areas or parts of areas by good scouting than by any other practice. The difficulty came in finding the scout. Many good crew foremen apparently could not scout. Our problem then, was to work out a method which would enable any man to do good scouting.

It is not intended that the method hereinafter described should in any way take the place of crew work where Ribes are so plentiful and so distributed that protection can only be economically and efficiently given by a crew. However, this method has proved itself of considerable

value in lowering the costs on a great number of areas where crew work had heretofore been thought necessary, to say nothing of improving the quality of the work on known scout areas.

Any good or average man can do "open scouting" such as searching for Ribes along stone walls, fences, rock piles, etc. His scouting difficulties lie in "closed scouting," the quick and thorough covering of such portions of an area as require systematic inspection for Ribes. The important factor in the following method of "closed scouting" is in the way the ground is covered and a paper trail laid on those portions as require thorough working. Careful observations of scouts in action showed that the average or inferior man was spending half as much to as much time looking for his trail, such as it might be, as he was spending looking for Ribes. A good man, on the other hand, was spending practically all of his time looking for Ribes, laying and keeping track of a good paper trail without taking any extra time. Methods were compared by observation, and later by experiment. The following method is the result of the facts learned.

On such ground as needs covering, a natural straight line boundary, such as a fence, is chosen as a starting line. The scout starts at right angles from this, takes five paces, or double steps, counting them, and drops a couple of pieces of paper. He here makes a right angled turn, and takes from two to eight paces, paralleling the starting line, laying his trail as he goes. The number of paces he takes depends on the number of Ribes, the density of cover, and the visability between him and his starting line or old trail. He than makes a second right angled turn and five paces bring him squarely back to his starting line, along which he takes not over two paces before turning and starting all over again. If he takes over two paces along his starting line, a gap will be left in the paper trail which will later prove confusing. All turns should be square turns. Paper trails should be parallel and never over five paces, or double steps, apart. Such flexibility as is desired, where variations might exist in Ribes population, density of cover, visibility, or other circumstances should be gained only by lessening or increasing the number of paces along the new paper trail.

The advantages are several. Right angled corners give rectangles. In these, the whole area receives adequate attention, whereas in a series of loops, more or less approximating a series of triangles, or in a series of triangles, the area at the apex gets too much consideration and the area adjoining the base, not enough. In addition, the paper in the trail itself is more equally spaced and the pieces are close enough together to make an easily seen line. Finally, the trails are parallel, instead of varying widths, and by keeping the distance between them five paces, or from twenty five to thirty feet, the line is there, and requires no particular looking for, when a man naturally and instinctively begins to look for it at about four paces from his former line.

By means of this method it was possible for a man, working along, to cover thoroughly from ten to twenty acres a day, even pulling as many as two hundred bushes.

Discussion:

Mr. Charlton's paper aroused considerable interest and he was given additional time to go into further details. This he did with the help of charts.

Mr. Handenberg (Mich.) in his usual dynamic way, made a few pointed remarks regarding the work in Michigan and also with reference to blister rust control work in general. Due to a cut in appropriations in Michigan, their work has been handicapped. At the present time, they are making a special drive on the eradication of cultivated black currants and intend to let nothing interfere with this work being pushed to a successful completion.

WHITE PINE BLISTER RUST CONTROL AT ACADIA NATIONAL PARK

By K. K. Stimson, Agent, Division Blister Rust Control

Acadia National Park, located on Mount Desert Island in Maine, is one of the scenic wonderlands of the Eastern United States. The present Park area comprises about 15,000 acres, with several thousand additional acres held in trust for future expansion. As described by Filler, "this tract contains a most unusual and interesting concentration of diversified topography, scenery and flora. A panorama unfolds numerous vistas of rugged granite mountains; sparkling lakes and streams snuggled between the hills; an irregular, island dotted, rocky seacoast; and a varied woodland growth of great attractiveness. From a scenic and forestry viewpoint, white pine is of special importance. The beauty of many of the most scenic places in the Park is due, to a large extent, to the fascinating pine growth in some unusual situations."

General scouting in the fall of 1927 revealed that blister rust was severely attacking the white pines on Mount Desert Island. The town of Bar Harbor immediately appropriated $2,000.00 for control work, in cooperation with the state, on private lands in that township. The control area in this township has been extended each succeeding year, and cooperative work has been in progress during the past two years in the adjoining township of Mount Desert. In 1928, the National Park Service in cooperation with the Bureau of Plant Industry took preliminary action to establish blister rust control on Acadia National Park lands located in the townships of Bar Harbor, Mount Desert and Southwest Harbor. During the fall, the Maine blister rust control agents made a preliminary survey of the Park to determine pine and Ribes conditions. Due to the defoliated condition of these bushes, little information was secured as to their abundance. However, a map was prepared showing the areas containing pine, regardless of the amount. The agents' survey also showed that pine infection was general throughout the park and that prompt application of protective measures was necessary. As a result of this survey, it was decided to begin control activities on the Park during the spring of 1929.

Pre-Eradication Survey

Such a survey was necessary in order to determine more accurately the location and abundance of white pine and Ribes and whether the pine was of sufficient scenic importance to justify control work. Using the original map made by the Maine agents as a basis for field work, each area was carefully inspected. Observations were made by traversing various trails and roads, sighting conditions from mountain tops and by running strips across the areas. In selecting the control areas, consideration was given to the present scenic value of the pine and its future position after competition with other species. As it was extremely difficult to accurately map the pine areas, due to the location of the pine in patches or as scattered trees in mixture with other species, and to the fact that the available maps were so small as to prevent such detailed presentation, it was decided to designate the blocks (pine areas and 900 foot protection zones) which should be cleared of Ribes, and to roughly indicate on the map the pine concentrations and areas of mixed pine growth.

An estimate of the total cost of eradicating the Ribes in each of the blocks was obtained in the following manner. Each of the areas was divided on the map into units based on difficulty factors involved in the control work. The factors given consideration in order of importance were topography, density of undergrowth, and abundance of Ribes. Each unit was then compared with a similar sample area on the Park which had been cleared of Ribes and for which accurate cost figures were available. Any differences in conditions between the comparable areas were properly weighted and an estimate made of the per acre cost of control in the unworked unit. After determining the acreage of the unit by means of a planimeter, it was a simple matter to figure the total cost of control work.

Results of Pre-Eradication Survey

In addition to the area of 1148 acres covered by the crew in 1929, the survey showed there were eleven blocks, totaling 5539 acres of present or prospective Park lands, which should be promptly cleared of Ribes to protect pine of great scenic value. Necessary protection zones covering an additional 957 acres brought the total control area up to 7644 acres. The estimated cost per acre for control work in the areas covered by the pre-eradication survey ranged from $1.10 to $5.77 per acre and averaged about $1.50 per acre for all units. These estimates covered only the actual cost of eradicating Ribes. It is interesting to note that in the six blocks where the initial control work has been completed to date, the estimated cost of the work was 4.5% more than the actual cost. In two of the units, the estimates were within $7.00 and $22.00 of what it actually cost to do the work.

Application of Control Measures

In applying control measures, standard sized crews of five men and a foreman have been used. Due to the fact that as near complete control as possible is desired, all areas have been systematically stripped by the crews in close formation; the various areas being worked in order of scenic importance, as outlined in the pre-eradication

survey. Only two species of Ribes (glandulosum and hirtellum) are found in this region, and the heaviest concentrations occur in the few swampy areas in the Park and along the lower rocky slopes of the numerous mountains. Incidentally, it has been necessary on several occasions to lower men down over ledges on ropes to eradicate Ribes in some inaccessible location. Detailed cost and Ribes figures have been kept for the various units and each day's work plotted on enlarged maps, different colors designating the section covered by the various crews. A fraction was used to show the detailed data for each day's work; the numerator denoting the date the work was performed, and the denominator indicating the number of Ribes which were pulled by the crew. Such maps will be of great value in planning a re-eradication program.

As a result of the control work conducted on the Park during the period 1929-1931, inclusive, a total of 5,810 acres have been cleared of approximately 390,000 Ribes at an actual working cost of $8,839.33, or $1.52 per acre. The per acre cost is much higher than the average for the Northeastern States, but this is due principally to the extremely rugged topography and the abundance of Ribes, which have averaged from 26 to 181 per acre in the units worked to date. Also, it has not been possible to work any of the areas by the scout method.

During this past season, considerable checking was done in the 1929 and 1930 control areas to determine the need for re-eradication. Very little Ribes regrowth was noted even among the rocks and in the swampy areas where the bushes had originally been very abundant. In one swamp site where thousands of skunk currants were pulled in 1930, only a handful of small Ribes were found during the course of an hour's checking. In fact, the only places where any amount of Ribes regrowth was located were in sections where thinnings had been made along the roadsides and in a large rock slide on one of the mountain slopes. This condition verifies the results of various Ribes ecology studies showing that the greatest regrowth of such bushes occurs in sites where the duff is disturbed.

In addition to accomplishing control of blister rust in the white pine areas at Acadia National Park, the project is being so conducted that definite information will be secured on the cost and effectiveness of establishing and maintaining control under such mountainous conditions.

Many diseased branches, in a dead or dying condition, are conspicuous on the white pines along the Park roads, drives and trails. In order to eliminate this unsightliness and prevent the death of most of these pines, the diseased branches will be pruned in sections where such work is thought practicable. This project will be started after the completion of the initial Ribes eradication work in 1932.

CHEMICAL ERADICATION OF SKUNK CURRANTS IN MASSACHUSETTS

By William Clave, Blister Rust Control Agent, Massachusetts

After carrying on chemical eradication experiments on a small scale for the past four years, it is possible for us to make a few statements in regard to this work without fear of having to contradict them at a later date. Our object in experimenting with chemicals as a means of eradicating skunk currants (Ribes glandulosum) is to reduce the cost of this work. Experience has shown that a good crew of men can, under most conditions, effectively eradicate these bushes by hand, but the cost is extremely high. If costs cannot be materially reduced by the use of chemicals, it would be impractical to use them as there are several bad features connected with their use which we do not encounter in hand eradication.

In our experiments, so far, we have used sodium chlorate, calcium chlorate or "Atlacide," magnesium chlorate, a complex copper salt and Diesel fuel oil. Some of these chemicals were tried at different concentrations and we have also tested different methods of application. Diesel fuel oil was used for the first time during the past season and therefore, we know very little concerning its effectiveness. During July 1928 we used sodium chlorate at the rate of 2.7 pounds to the gallon of water and applied the solution to the stems and leaves of the plants. Within a week after treatment, all plants on the plots had become defoliated and the outlook was encouraging. Four or five days later sprouts appeared in all parts of the plots. Most of these started at or near the ground surface but a few appeared higher on the live stem and some from the tips. While the first check revealed that 80% of the live stem had been killed the indications were that there would be a considerable amount of new live stem within a short time. It was evident that the effect of the chemical had not penetrated to the roots and unexposed layering stems. At the present time these plots contain almost as much live stem of skunk currant as they did before they were treated. The chemical killed back practically all of the other vegetation and the skunk currants surely took advantage of the favorable conditions for their growth.

In the fall of 1928 other plots were located and treated with the same chemical solution. On these plots, we not only sprayed the exposed live stem and leaves but also forced the chemical into the soil in an attempt to kill the roots. One of these plots was sprayed after natural defoliation had taken place. A check the following spring disclosed that a complete kill of all the plants had been obtained.

During July 1929 four plots were treated with magnesium chlorate, calcium chlorate, sodium chlorate, and the complex copper salt respectively. This same experiment was repeated in September of the same year. On all of these plots the chemical was applied to the soil as well as to the stems and leaves of the plants. A 100% kill of the live stem was obtained on all plots sprayed with the chlorates but the complex copper salt was only partially effective. The latter chemical did not kill all of the roots, and a large amount of sprouting developed.

These two plots are rapidly returning to their original condition. The difference in results from the use of the chlorate and the copper salt must be due to the action of the chemicals as all these plots were adjacent and were treated at the same time, with the same amount of chemical solution.

While our experiments would indicate that, in order to secure a complete kill of Ribes glandulosum, soil application of the chemical is necessary, I do not believe that we have yet found the lowest concentrations at which these chemicals can be used and still maintain their effectiveness. There is little hope, however, of being able to reduce the cost below that of hand eradication at the present cost of these chemicals. The chemical solution that we can use must be either very low in cost or highly effective at low concentrations.

The labor cost of chemical eradication is difficult to estimate. It will vary greatly according to the equipment used and the method of applying the chemical. We found in our work that by using the five-gallon knapsack tank with hand pump attached, it took from eight to ten minutes to apply five gallons of the chemical solution. Applying the chemical to the soil, stems and leaves, one gallon covered an average of 70 square feet, while in spraying just the stems and leaves, one gallon covered about 280 square feet. These figures would, of course, vary with the density of the Ribes growth but, as chemical eradication would probably be used only on the heaviest concentrations of Ribes, these figures give a rather fair basis for figuring costs.

One of the bad features in the use of chemicals is that they kill practically all of the other vegetation as well as the Ribes. This opening up of the area is an aid to the germination of the Ribes seeds that are in the soil and on several of our plots seedlings have appeared in great numbers. On some plots only a comparatively few survived but enough to insure a good stocking of Ribes on these areas. On one plot, where a complete kill of the original Ribes took place after soil application of sodium chlorate in the fall of 1928, thirty six seedlings appeared the next spring. When found in 1929 they were less than an inch in height. At that time we marked the location of each one with a small wooden stake. A check this year revealed that twenty-two of them had survived and now contain 153 feet of live stem. One of these seedlings had produced approximately 40 feet of live stem. This particular plot originally contained 800' of live stem. The original plants were completely killed by the chemical but at the present time the live stem of the 1929, 1930, and 1931 seedlings just about covers the plot. This condition is unusual and was not found on any of our other plots but it is something that will have to be considered in any chemical eradication work.

During the past season we have tried calcium chlorate or "Atlacide" and ammonium thiocyanate on wild black currants. These chemicals were used at four different concentrations. As all of these plots are located in Berkshire County I have not had an opportunity of watching the results.

Before closing, I would like to say that, even though this paper gives little encouragement for the use of chemicals in the eradication of skunk currants, we are not discouraged. Our investigations have been on a very small scale and there is a great deal to be accomplished along this line. There is great possibility of reducing the costs of eradication by the use of chemicals but there is little possibility of ever reducing the cost of hand eradication very much.

CHEMICAL ERADICATION OF RIBES IN NEW HAMPSHIRE

By L. C. Swain, Blister Rust Control Agent, New Hampshire.

Although the use of chemicals for eradication of Ribes has been for the most part confined to the Western States, agents in charge of blister rust control in the East have followed with much interest the success of these operations.

While it is true, that for the most part, hand-pulling methods in the Northeastern States are both economical and effective, there remain certain areas where the cost is not only prohibitive but where hand pulling is not highly effective largely on account of associated plants. These areas exist in each of the seven control districts of New Hampshire, but especially in my own, the southeastern district. Here occur meandering springy runs and swamps or old meadows attaining in some cases widths of 1/4 to 1/2 mile, and several miles in extent. Extending down to the edges of these areas, and in some cases actually growing within them, are white pine stands in varying degrees of age and quality. These sites seem to be the optimum for rank growth of meadow grass, spirea, wild rose, raspberry, goldenrod, trailing blackberry, fall aster, and Ribes hirtellum. These lower growing bushes are in some instances overtopped by alder and dogwood; and in other cases, the alders and dogwood are low growing so that the whole growth is between waist and shoulder high. The cost of eradicating Ribes in such areas by hand pulling is not only excessive but the effectiveness of such work is questionable due to the rapid regrowth of the bushes.

On May 3, 1931, Doctor Martin, Mr. E. C. Filler, Mr. H. R. Offord, and Mr. L. E. Newman visited this district and spent the day in examining such field conditions. Through this inspection the party was able to secure a better understanding of the problem of Ribes eradication in such areas, and Mr. Offord later submitted a report for the chemical treatment of Ribes in special plots.

The three materials for chemical treatment suggested by Mr. Offord were, "Atlacide," sodium chlorate, and Diesel oil (fuel grade). The Western office supplied a knapsack-type sprayer and the State Forestry Department furnished utensils for mixing, such as a 40 quart milk can pail and strainer.

Agent Clave of Massachusetts gave valuable suggestions for procedure in the experimental plot work as he had conducted chemical work of this nature during previous seasons in his district.

Plots were laid out in the towns of Exeter, Kensington and Brentwood. These plots were necessarily somewhat smaller than recommended, as it was desirable to lay them out where Ribes were abundant, and in most instances runs are too irregular to permit of making standard size plots. Compass and tape were used in laying out the plots and the corners were marked by highway grade stakes. Heavy cord was used in defining plot limits.

Each plot was divided into units and the amount of Ribes live stem in each subdivision was ascertained by measuring the length of the living canes and branches.

"Atlacide"

Two plots were treated with this chemical; one, 25 x 25 feet, and the other 50 x 50 feet. Although these two plots were situated quite near each other, a remarkable difference in Ribes characteristics and surrounding growth was found as will be apparent by a description of each.

In the smaller plot, Ribes hirtellum were found in a dense growth of swamp grass about 3' high. The grass completely covered many of the bushes. The Ribes in this plot had long stems and the leaves were thinner and much larger than those in the adjoining unit. Moreover infection was much heavier.

Less than 20 feet distant, Ribes in the 50 foot plot were found to be growing in a dense cover (a swamp and heath type) composed of fall asters, meadow grass, spirea, golden rod, dogwood and a few low, bushy alders. Under this cover, hirtellum was quite different in form and general characteristics from Ribes in the plot previously mentioned. They were bushy with small leathery-like leaves and practically free from infection.

Both plots were sprayed with "Atlacide" on August 19th, the application being directed against the leaves and stems. Two pounds of the chemical were used to the gallon of water, and liquid in the amount of 16 gallons applied. The spraying time for each plot, exclusive of mixing, was 20 minutes. The spraying was done in strips working from left to right and back again across the plots.

Checking

The first check made three weeks after application, all the season's leaves of Ribes were found to be killed, also the leaves of other vegetation. New buds and leaves appeared on all Ribes. The buds on previous years stems seemed less vigorous.

Sodium Chlorate

Three plots were laid off for the purpose of applying this chemical. The types were (1) meadow and heath, (2 and 3) low hardwoods and pine (about 10 per cent).

The plots were laid off in "milacres" (6 1/2 x 6 1/2 ft. sq.). One plot contained 8 milacres; one 16 and the other 4 milacres. They were sprayed on August 26 and August 31st, and the quantity of chemical applied was 5 gallons of liquid per milacre. The strength of the solution was 3/10 pounds per gallon of water, or 1 1/2 pounds per 5 gallon tank.

The ground was very moist due to an abundance of springs. Ribes were small, but numerous. In some instances defoliation had already begun.

Instead of using the special nozzle, which threw a fan-spray, an ordinary shower-bath nozzle was purchased from the Woolworth Stores. This type of nozzle permitted the spray to be applied much faster; in fact, twice as fast as with the fan-shaped spray.

The time consumed was four milutes per milacre.

Checking

Sixteen days after spraying with sodium chlorate the season's leaves appeared to be totally killed, but the buds appeared to be alive. The season's growth of stem seemed shrunkened and withered. All other vegetation was apparently killed. Some discoloration was noted on the stems of Ribes.

A maple, about 5 inches D.B.H. and 30 feet in height, with a good full crown, lost all its leaves within a week after spraying. In about three days time the progress of the chemical was apparent by a yellowing of leaves approximately half-way up the tree.

Diesel Oil

A total of six plots were laid out for oil application. They ranged in size from a roadside plot 10 x 20 feet to a meadow plot 50 x 50 feet. Three plots were located in skunk currant growth (Ribes glandulosum) and three in Ribes hirtellum sites.

One of the skunk currant plots when sprayed (September 1st) was entirely defoliated, and the other two partially. A very heavy spray, 3 gallons to 200 square feet was used.

In the case of the gooseberry plots, sprayed on August 19th and 25th, the amount of oil used was 10 gallons to 2,500 square feet.

Since the oil application was made in the late summer the density of foliage of associated plants was very heavy. This required a far

greater application of oil and caused considerable difficulty in getting sufficient oil on the entire leaf-surface of the Ribes.

Checking

On date of first check of the effectiveness of the Diesel oil (September 11th), three weeks after its application exposed bushes or parts of bushes, appeared in a dying condition. Buds were blackened and upon opening them up a decided yellowing was observed. All appearances seemed to point to their having been killed.

Conclusions

(1) These limited experiments indicated that the application of oil was accomplished with greater ease and less time than chemicals. Oil is its own lubricant, and therefore the pump action was much easier.

(2) Oil appears to cover all parts of the plants more completely and to be retained by them for a longer period than the other sprays.

(3) In many locations oil is handier to apply since there is no mixing or water to haul.

Note: At the conclusion of his paper, Mr. Swain showed an interesting series of lantern slides by use of the stereomatograph.

Discussion of Clave's and Swain's Papers

Mr. Fivaz (Washington Office) commented upon experiments he had undertaken where on plots treated chemically, fewer seedlings developed on the sprayed plots than on the untreated plots. This occurrence has as yet been unexplained.

Mr. Doore (Mass.) was requested to comment upon plots established in his district where Ribes americanum were treated with calcium chlorate and ammonium thiocyanate. He believed that, although the ammonium compound has acted very slowly as compared with the "Atlacide," the ultimate results may be more effective. He also believed that it is too early to make any predictions.

Mr. Littlefield (N.Y.) warned of the danger in the use of chlorates, due to their inflammability. He recommended that all field men be forewarned.

Mr. Charlton (N. Y.) inquired whether the time of year that spray was applied had affected the results.

Mr. Clave (Mass.) replied that the time of the year doesn't seem to make very much difference, as far as he can tell at the present time.

Mr. Ritter (Minn.) understood that in the West, the chemical work is discontinued about the first of August. It appears that the storage of starch is low in the summer, and is more easily broken down by chemicals at that time than later when the starch storage is greater.

Mr. Putnam (Federal Supervisor in the Lake States) was called upon to inform the conference regarding spraying in the West. He confined his remarks to a discussion of the preeradication survey. In these surveys data regarding the width of stream-type, the density (heavy, light, medium) of Ribes growth are recorded on maps. One of the purposes is to better distribute the cans of chemicals at points where they will be needed.

Mr. Riley (Conn.) believed that there is a need for chemical eradication in nursery sanitation zones wherever Ribes are extremely difficult and costly to eradicate. He hasn't obtained much encouragement, however, from the results of the experiments that have been carried on thus far.

Mr. Pierce (D.C. office) inquired whether or not there would be any value in planting spruce and hemlock in some of these swamps which would thus shade out the Ribes. Chairman Littlefield called upon Mr. Filley (Conn.) for comment on the suggestion, but Mr. Filley replied that his planting experience did not include planting in swamps.

Mr. Newman (N.H.) believed that early spring spraying is an advantage, because of the absence at that time of competing vegetation. Later in the season there is five or six times the vegetation that is present in the early spring.

THE BASIS AND PROCEDURE IN REERADICATIVE WORK

By C.C. Perry, State Blister Rust Control Leader - Massachusetts

For several years now the subject of reeradication has been on our annual conference program for discussion. If my recollection serves me, the discussions in the past have been very brief. I expect that the reason for this is that we have all been too busy trying to solve the problems connected with the initial eradication of Ribes. Today, however, some States are face to face with this phase of blister-rust control. That is to say, the initial work has been practically finished, or at least conditions are such that we must devote some additional attention to the areas that were initially examined for Ribes, five, seven, nine, or more years ago. What if anything must we do now in these areas to maintain control?

It is needless for me to say that no one person can lay down any definite program that can be followed by all the States, or followed even in all sections of one State for that matter. Conditions vary too much. For that reason, I can only attempt to outline to you, how we propose to approach the problem, as far as Massachusetts conditions are concerned. This may or may not serve to stimulate a discussion of the subject as a whole.

As I see the problem, we now have, as a result of our initial program, more or less complete data regarding the natural distribution of white pine in our respective districts. We know also what our infection conditions are or have been, and finally, we know something at least, regarding the prevalence, species, and distribution of wild Ribes as we originally found them. To my mind, the securing of this information, has been one of the real accomplishments of the initial program.

With this information at hand, what we propose to do is to eliminate from consideration for the time being, and in some instances completely, a number of towns in which there is not likely to be a further blister rust problem for some time to come. Such towns are those in which white pine is too scarce or of insufficient value to warrant protection, or towns where there may be a good representation of white pine, but where wild Ribes are practically absent and there is no cultivated-Ribes problem.

Our next step then is to classify the remaining townships in accordance with the urgency or need for additional control work. In classifying our towns on this basis, we shall resort to a consideration of three factors to determine the degree of urgency. These factors are, the relative abundance of infection; the relative abundance and value of white pine; and the relative abundance or character of the distribution of wild Ribes. By a consideration of these factors, we expect then to allocate our towns to three groups; namely, (1) those in which further control work is urgent; (2) those in which further work is necessary but not immediately urgent; and (3) towns in which further work is desirable but not absolutely essential. It is appreciated that this system is open to the objection that there may be individual pine areas in many towns which require immediate attention, but, because of other conditions in the towns, they will be classified in a group of lower urgency. It has been our experience that with Massachusetts conditions at least, our efforts are best expended by working systematically in a small group of towns and completing the work in those towns, rather than doing a small amount of work in a larger number of towns and returning each year until completed.

In determining the urgency status of a town, it is, of course, clear that the greatest urgency prevails in towns where there is the greatest value of white pine represented. In such groups then, the greatest degree of urgency will prevail where infection has already advanced and where Ribes were found in some abundance in the original program and so situated that if a recurrence does take place, the hazard will continue. A still lower degree of urgency can be said to exist where little or no advance infection is present, but where Ribes may recur, and, therefore, constitute a potential hazard. There will, of course, be numerous combinations of pine, Ribes and infection conditions that will result in varying degrees of urgency.

So much for the <u>basis</u> of reeradicative work. Now as to <u>procedure</u>. Our plans are not completely formulated, nor are they entirely clarified, but obviously, we shall begin reexaminations in the group of towns where the hazard of a continued spread of the disease is greatest.

Our first move then will probably be to circularize or interview our former cooperators in those towns, and advise them that we intend to follow up the initial work by a plan of reexamination. We shall, at the same time, solicit the continued cooperation of owners in the removal of any recurring Ribes. There will have been, of course, changes in ownership, and it will be necessary to recheck our records and interview any new owners, in order to acquaint them with the blister rust situation.

Having informed the owners of our plan for further work, we shall then proceed, when field conditions permit, to reexamine the control areas, established in the initial work. In this reexamination, we shall probably depart from the policy adopted in 1922 in the matter of securing the immediate participation of the owner. Instead of endeavoring to secure the presence of the owner when the lot is reexamined, we shall have our field men do the preliminary work in an entire control area or town block; determine conditions, and if the distribution and abundance of Ribes is such as to require crew work, we shall then call upon the owner for his services. If Ribes are only found in small patches and in definite locations, our experience has shown that it is more efficient for our men to eradicate the bushes as they go along. When there are extensive concentrations or a scattering distribution of Ribes over the entire area such as to require crew work, the owner will then be contacted and his cooperation solicited. In brief, it can be said that our eight or more years of experience has shown us that it is more in the line of real economy to have our trained men do the preliminary work unaccompanied by the owner and rely upon the owner for service in connection with crew work. At best, the owner can or at least will give but little of his time to the project, and that time can better be expended in the way of crew labor than in scouting to determine Ribes conditions. In essence, and except for this one change in procedure, our plan for reeradicative work cannot differ appreciably from that employed in the initial work. I appreciate that we are giving little consideration to the application of some of the findings of ecological investigations, the classification of pine according to hazard, etc. but I have as yet been unable to see how to make practical application of many of these factors. It has always seemed to me personally, that until the public accepts or has a better understanding of some of the simpler principles of forest management, we in blister-rust control can hardly expect the public to understand some of the refinements, shall I call them, of blister-rust control. Changes in policy and procedure must be made slowly.

This in brief, is our plan for attempting to maintain the control of the blister rust in Massachusetts. There are many problems involved. The plan is tentative. It is subject to modification and improvement along many lines.

PAPERS ON CONTROL INVESTIGATIONS

GENERAL REMARKS

By Dr. J. S. Boyce, Forest Pathologist, Yale Forest School

Investigative work on white pine blister rust in the West by the Division of Forest Pathology has been predicated on carrying out all experiments under as nearly natural conditions as possible, so that the results could be applied directly, and with confidence to control measures. The relative susceptibility of the more important Ribes native to the western white pine region was first determined by artificial inoculations of bushes growing naturally in localities well removed from any possibility of a significant amount of infection by long distance spread of aeciospores from pines. These experiments showed that certain Ribes were extremely susceptibile, while others, among which the prickly currant (Ribes lacustre) was included, were low in susceptibility. However, susceptibility of a Ribes to blister rust is not necessarily a true measure of its damaging power to pines, although it is a good indication of what may be expected. Accordingly, experiments have been under way for several years and already are giving results on the damaging power of the less susceptible Ribes. The method used is to artificially infect a group of bushes of one species of Ribes in the center of a plot of reproduction of western white pine located in an extensive area freed from all other Ribes. The effect of the rust on the pines is then followed closely. Apparently the less sucepptible Ribes are capable of severely damaging pines in their immediate vicinity. The same investigations are being started for native Ribes of the sugar pine region.

The susceptibility of pines is also being tested. Plantings of western white pine (Pinus monticola), sugar pine (P. lambertiana), and eastern white pine (P. strobus), the latter to serve as a standard of comparison, have been established in localities where blister rust is epidemic. Results so far show western white pine to be much more susceptible than eastern white pine, while sugar pine is at least as susceptible as western white pine. In addition several other species of pines are being tested, particularly Macedonian pine or Balkan white pine (P. peuce) and Himalayan or blue pine (P. excelsa), a native of the Himalayan Mountains. These species, because of their seeming resistance to blister rust, have been suggested as possible planting substitutes for our native species, so it is essential not only to test their reaction to blister rust but equally important to determine their resistance to certain indigenous parasites which though found on western white pine, do not prevent this tree from forming stands of commercial value.

European workers have suggested that the purple fungus (Tuberculina maxima), which parasitizes blister rust on pines, preventing the formation of aeciospores, should be valuable in controlling the disease. This or a very similar fungus is present within the range of blister rust in western British Columbia and apparently is native there. In one

locality where the blister rust is very severe, this fungus parasitizes many aecia, yet far more are not attacked so that a sufficient volume of aeciospores is released to infect Ribes heavily, and western white pine is being steadily eliminated from the locality. The evidence so far indicates that this method of control is not promising.

Discussion:

Mr. Ritter (Minn.) inquired whether rust infection takes place through the stomata of the leaves.

Dr. Clinton (Conn.) confirms the fact that infection does take place in that way, although it may take place through stoma in the bark of the young growth.

Mr. Littlefield (N.Y.) inquired regarding the use of Pinus excelsa.

Dr. Boyce (Conn.) replied that the species grows slowly in sections where temperatures do not go low. It is the opinion that it will not be sufficiently hardy for use in the Lake States or New England. Pinus peuce may be satisfactory.

Mr. Detwiler (D.C.) inquired about the effect of Tuberculina maxima.

Dr. Boyce advised that this fungus has been in the country for a long time, but all it accomplishes is to reduce the intensity of infection. There is very little hope that it will be of any service whatever. In sections in the West white pine is being wiped out after only eighteen years, even though Tuberculina maxima is very abundant in the same area.

Suggestions for Further Investigations:

Mr. Newman (N. H.) recommended the study of the apparently different varieties of R. hirtellum that had been found in New Hampshire.

Mr. Handenberg (Mich.) recommended further study of Ribes varieties as they occurred in Michigan.

Mr. Riley (Conn.) suggested the continuance of the experiments in the chemical eradication of Ribes.

Mr. Detwiler (D.C.) counselled that there is a need for personal investigations on the part of each field man, especially along the line of developing methods of control and other matters of a practical sort. We are also in need of more data to demonstrate the effectiveness of control.

Mr. Detwiler (D.C.) felt that more personal experiments are needed to "keep up steam" so to speak.

Mr. Foster (N.H., inquired regarding the status of investigations on the regrowth of Ribes.

Mr. Fivaz (D.C.) informed that this work is still in progress and definite results are expected shortly.

Mr. Pierce (D.C.) wishes to know whether the suggestion regarding the study of Ribes species as proposed by Mr. Newman (N.H.) applied to all species or just those we have in the East.

Mr. Fivaz (D.C.) called attention to the fact that most of his studies are with rotundifolium.

Mr. Foster (N.H.) believed that the study of regrowth of Ribes is an important field of investigation and cited their recurrence along certain power company holdings in New Hampshire.

Mr. Riley (Conn.) in connection with the regrowth of Ribes, felt certain that eight years between examinations is too long a period.

Mr. Fivaz (D.C.) emphasized the opportunity that each and every field man has for research in his own district, and offered to be of every assistance possible.

Discussion

Dr. Meier (New York) was called upon by Chairman Boyce for comment upon Dr. Hirt's paper, and was pleased to say that he was "an interested spectator of faithful work." He believed that Dr. Hirt is completely correct in making no definite decisions at the present stage of his investigations.

Dr. Clinton (Conn.) also warned against the premature formulation of too general conclusions.

Mr. Clave (Mass.) inquired whether or not any difference was noted in the degree of infection between the pines on the ground and those at a slight elevation above the Ribes.

Dr. Hirt (N.Y.) found that there was a slightly heavier infection on the pines on the ground.

PATHOLOGICAL AND MYCOLOGICAL NOTES ON FUNGI OBSERVED ON WHITE PINE

Glenn Gardner Hahn
Associate Pathologist
Division of Forest Pathology

Pathological and mycological notes concerning observations of fungi on white pine (Pinus strobus) made by G. G. Hahn and T. T. Ayers were scheduled to have been reported at the conference, but time did not permit their presentation. These notes are as follows:

White Pine Needle Blight (Septoria spadicea)

The status of the white pine needle blights has been a subject of considerable discussion. It is the opinion of Spaulding that the pathological symptoms shown among blighted pines is a complex of several different diseases. The needles commonly are killed for one-quarter or one-third of the entire length of the leaf, and in extreme cases dead tissue extends to the base. The blighted leaves take on a reddish brown color and are conspicuous particularly when they are contrasted with the green color of unaffected, normal trees. Spaulding in his discussion of white pine blights (U.S.D.A. Circular #35, Aug. 1909) listed a number of fungi commonly found on the dead leaves. One of these, Septoria spadicea Patterson and Charles, occurred regularly on diseased parts.

While in Maine during the past summer (August) the author was taken by Mr. H. B. Pierson to an area near Augusta on the Belgrade Lake Road which was infested with needle blight. The diseased area consisted of a two acre strip in which the white pines in a mixed hardwood stand were so heavily affected, they appeared as if they had been previously scorched by fire which had caused them to become reddish brown. Pierson had observed the blight since June 1931.

Collections of the blighted needles were made at the time. Pierson later collected blighted needles from different parts of trees located at the top and bottom of the hill. His collections also included blighted needles collected from the ground. One collection was taken from a tree which according to Pierson, had not been affected by either smoke or drought injury.

In all of the above collections Septoria spadicea was found occurring abundantly. This fungus agreed with the description of the new species given in Spaulding's circular. In preliminary experiments that author attempted to prove the pathogenicity of the organism but his limited inoculation tests gave negative results. Spaulding stated that his results were non-conclusive in that he might not have supplied the necessary conditions for fungous infection. Further investigation of the possible parasitism of S. spadicea might yield valuable information.

White Pine Canker (Sphaeropsis Ellisii)

A canker was observed in a young plantation of 10-15-year-old white pine at Potowomut, (Goddard Memorial Park) Rhode Island with which a species of Sphaeropsis, tentatively regarded as S. Ellisii Sacc., was found commonly associated. This canker occurred about pruning wounds where branches had been lopped off. It was also found on weakened, suppressed branches. Other collections of the fungus on white pine have been made by Ayers in the vicinity of New Haven, Connecticut and by Hodgkins and Geiser in the Shenandoah National Forest, Virginia.

The white pine Sphaeropsis is a close relative of S. malorum Berk. (=Physalospora cydoniae Arnaud) which causes the well-known black rot and canker of pomaceous fruit. Further experimentation should be carried on to deomonstrate the identity and pathogenicity of the white pine organism. The genus which is of considerable economic importance in horticulture may contain a future enemy of planted white pine.

Canker on White Pines (Dasyscypha fuscosanguinea)

In Blister Rust News, 14:326, 1930, Hodgkins described a disease of white pine in the Upper Peninsula, Michigan (Keweenaw and Marquette counties) resembling European larch canker which according to his observations appeared to be as serious as white pine blister rust. Again in 1931 Putnam (Blister Rust News, 15:255) reported the same disease from the Upper Peninsula apparently caused by a fungus resembling Dasyscypha.

Specimens of the above-mentioned cankers have been examined and they show the presence of a species of Dasyscypha, which has been identified as a form of D. fuscosanguinea Rehm of Europe. This species occurs on Pinus cembra and P. pumilio in the Tyrol Alps, Finland and Scandinavia. In Sweden Lagerberg reported the fungus as a pathogene, particularly in the northern pine-barrens where climatologic conditions are severe. He listed D. fuscosanguinea among the fungi which he regarded as serious enemies to reforestation. Baxter in conversation informed the author that he had observed the organism occurring abundantly associated with cankers in the Land of the Midnight Sun. In the United States, Stillinger reported the species on western white pine (Pinus monticola) in Montana, Idaho, Washington and British Columbia.

Dasyscypha fuscosanguinea is a highland type organism behaving similarly to the European larch canker in its reaction upon attacked trees. There is an increase of thickness of the infected trunk or branches which becomes unequal at the point of attack due to the fact that the bark (cortex) and cambium are killed on one side. The canker is covered by a strong flow of resin. In cases where girdling is almost complete, the top from which nourishment has been slowly cut off, eventually dries up. The accumulation of snow tends to bend downwards the diseased portions so that after overwintering the bent affected trees may retain this position.

The New Haven branch of the Division of Forest Pathology is making an intensive study of parasitic members of the genus Dasyscypha (including European larch canker organism) affecting conifers. This involves an investigation of the forms of D. fuscosanguinea on eastern white pine and closely related strains also associated with canker of western white pines, Pinus monticola and P. albicaulis collected by members of the Portland Office, Division of Forest Pathology. Further collections of the species will be greatly appreciated.

A BRIEF REVIEW OF THE COOPERATIVE BLISTER RUST CONTROL INVESTIGATION BEING CONDUCTED AT THE PACK DEMONSTRATION FOREST AT WARRENSBURG, N. Y.

Ray R. Hirt, Forest Pathologist, New York State College of Forestry.

Those of you who have been present at these conferences for the past few years will recall that in the fall of 1928, Dr. L. H. Pennington reported on an experiment that was started during 1927 at Warrensburg, N. Y. The purpose of this experiment was to determine the meteorological conditions favoring the natural infection of eastern white pine by Cronartium ribicola. Since Dr. Pennington's death in 1929, it has been my privilege to continue that particular investigation.

In brief, the methods of procedure are as follows. Each spring approximately 2500 two-one or two-two white pine transplants are potted in 6-inch paper pots. These potted plants are temporarily set in beds of 100 plants each in an area protected from blister rust infection.

A Ribes garden made up of Ribes nigrum bushes was established at the beginning of the experiment in 1927. These bushes become naturally infected each spring, and as soon as infection becomes evident they are examined daily for the first appearance of telia. As soon as telia appear the work of exposing the potted pines to rust in the garden begins. Each morning 10 potted pines are brought to the garden, 5 of the pines being placed on the ground below the level of the bushes and 5 on posts above the bushes. The pines are left here until 8 o'clock at night when they are removed to a protected permanent planting area. Here they are planted in definite rows of 20 plants each and in definite positions in the rows, depending upon their position in the garden during exposure. At the time the first ten plants are removed from the Ribes garden, 10 more are brought in and exposed until 8 o'clock the following morning, and so on throughout the season.

At the garden there is an automatic sun recorder, a rain gauge, and a hygrothermograph. Hours of rainfall, fog, and dew are also recorded. Prior to placing the pines in the garden, the total linear measurement of the needles by years is recorded for each potted plant. Likewise the total Ribes leaf area is determined, total infected area, the area producing telia, and by daily microscopic examinations the percent of telia producing sporidia.

In addition to the 10 potted plants exposed every 12 hours, 4 more are used. Instead of these being transferred immediately after exposure to the planting area, they are placed in a damp chamber for 36 hours. In the chamber the temperatures range from about 55° to 65° Fahrenheit and the relative humidity is approximately 95 or higher. At the end of 36 hours the plants are removed and placed in the permanent planting area. The purpose of this will be given later in the paper.

It might be well to mention that the handling and planting of these pines throughout the entire summer does not affect their growth or survival to any appreciable extent.

The infections resulting in 1927 are shown in the following table.

Table 1 - A tabulation of the infection record of 1927 as rechecked during the summer of 1929.

Date of exposure in 1927	Infections in internodal growth of		Total no. of infections	No. of trees on which infection was found
	1926	1927		
July 14	0	0	0	0
" 15	0	0	0	0
" 16	0	0	0	0

July	17	1	0	1	1
"	18	1	1	2	2
"	19	1	1	2	1
"	20	0	1	1	1
"	21	0	0	0	0
"	22	0	0	1	1
"	23	2	0	2	2
"	24	4	0	4	4
"	25	3	0	3	3
"	26	1	0	1	1
"	27	1	2	3	3
"	28	1	0	1	1
"	29	2	0	2	2
"	30	12	2	14	10
"	31	83	106	189	13
Aug.	1	7	12	19	9
"	2	1	0	1	1
"	3	3	1	4	3
"	4	0	0	0	0
"	5	0	0	0	0
"	6	3	0	3	2
"	7	1	2	3	3
"	8	0	1	1	1
"	9	2	0	2	2
"	10	0	2	2	2
"	11	0	0	0	0
"	12	1	0	1	1
"	13	0	1	1	1
"	14	1	1	2	1
"	15	0	0	0	0
"	16	3	0	3	3
"	17	0	0	0	0
"	18	1	1	2	2
"	19	0	0	0	0
"	20	0	2	2	1
"	21	1	0	1	1
"	22	1	0	1	1
"	23	5	0	5	4
"	24	0	0	0	0
"	25	19	0	19	8
"	26	36	1	37	13
"	27	247	64	311	19
"	28	63	58	121	17
"	29	23	13	36	12
"	30	26	11	37	16
"	31	17	9	26	12
Sept.	1	24	10	34	14
"	2	4	2	6	6
"	3	0	1	1	1
"	4	0	0	0	0
"	5	0	0	0	0
"	6	0	1	1	1
"	7	0	0	0	0

Sept. 8	1	0	1	1
" 9	0	1	1	1
" 10	0	0	0	0
" 11	0	0	0	0
" 12	0	0	0	0
" 13	0	0	0	0
" 14	0	0	0	0
" 15	0	0	0	0
" 16	2	2	4	3
" 17	1	0	1	1
" 18	0	0	0	0
" 19	0	0	0	0
" 20	1	0	1	1
" 21	0	0	0	0
" 22	1	1	2	2
" 23	2	0	2	2
" 24	0	0	0	0
" 25	1	0	1	1
" 26	1	1	2	2
" 27	0	0	0	0
" 28	2	0	2	1
" 29	1	0	1	1
	615	311	926	218

The days of heaviest infection are July 30, 31 and August 25 to September 1.

By figuring average temperatures and humidities for 12-hour periods corresponding with the 12-hour exposure periods, it was found that the infection periods were intervals of high humidities and average temperatures approximating 55° to 65° Fahrenheit. Since in 1928, curves similarly constructed showed corresponding periods of high humidities and medium temperatures, Dr. Pennington logically assumed and predicted that 1928 would show as heavy if not heavier infection than 1927. However, only 3 infections occurred as compared with over 900 in 1927. 1929 showed 5 infections, and 1930 only 3 infections even though there were periods similar to the infection periods of 1927. Hence it seemed that some factor other than weather alone was important. The first thing to suggest itself was naturally the abundance or scarcity of sporidia during the extended cool, humid periods of 1927, 1928, 1929, 1930. Partly to determine this, the damp-chamber experiment was started, daily examinations of the telia were made, telia germinations studies were begun, etc.

By setting up the damp chamber, it was possible to take plants from the garden and expose them to conditions of humidity and temperature similar to those of 1927 when infection did occur. If, after exposure, no infection resulted, then there would be some evidence that sporidia were lacking; however, if the damp-chamber plants did become infected and not those in the open, it would show that sporidia were produced and

present under conditions which did not favor natural infection of white pine. It would also give a further lead as to what conditions do or do not favor pine infection.

During 1930, the damp-chamber plants gave interesting results. To date on the 640 plants used in the damp chamber, 37 infections have been found on 22 plants for 17 different days during the season. In the regular planting area on the 1600 plants used, a total of 3 infections on 3 plants for 2 different days resulted. In the damp-chamber plants the infections per 12-hour period varied from 25 to 75 percent of the trees exposed; in the regular experiment one period showed 10% and the other 20% infection.

It is apparent then that weather conditions permitting sporidia production does not necessarily permit of pine infection. It seems even possible that sporidia exhaustion might happen without favorable infection weather occurring, or might even be followed by favorable infection weather with consequent lack of infection. Further work is required to substantiate such a suggestion.

Certain work of the past summer indicated that for various reasons there are periods in the life history of the fungus on Ribes leaves when favorable weather conditions will induce heavy sporidia cast, and that weather under which infection in 1927 occurred might very well be a stimulus for such heavy sporulation. If weather favoring pine infection occurs at these intervals it seems likely that heavy pine infection will occur. It remains to be seen whether this will account for heavy-infection-years and light-infection-years even though weather conditions are similar as they were in the heavy infection year of 1927 and the light infection year of 1928.

With high humidity favoring both sporidia production and pine infection, it would seem that temperature is a great influencing factor. Work of the past summer indicates that even though telia are in prime condition to germinate, certain temperatures will induce abnormal basidia with no sporidia or at most one sporidium per basidium instead of the usual four. Other temperatures will induce fair to abundant sporulation. Sporidia may be hastened or retarded in their germination by varying the temperature, and certainly to some extent be induced to produce either secondary sporidia or germ-tubes, that is infection tubes, and all within a rather limited range of temperature.

This gives a very limited picture of our work at the Pack Forest, Warrensburg, N. Y. on the correlation of weather conditions with the natural infection of white pine by Cronartium ribicola. Of course, the investigation involves much more work than I have indicated here. I have purposely not committed myself to any definite conclusions, since I do not feel that the work has progressed to the point where definite conclusions are warranted.

NOTES ON THREE SERIOUS TREE DISEASES

By G. P. Clinton, Botanist, Connecticut Agricultural Experiment Station.

During the past twenty-five years, I have been interested first in the chestnut blight, then the white pine blister rust and recently in the willow scab. I wish here to make a few remarks concerning each without going into any details concerning these special fungi or their injurious effect on the special hosts. But I do wish to bring before you a few observations and experiments dealing with each as revealed in my more recent work.

Chestnut Blight, Endothia parasitica.

I start with the chestnut blight since this was the first to receive my especial attention. I wish to consider it briefly under the three headings--(1) condition of native chestnuts in our woodlands, (2) recently planted chestnut plots, (3) recent infections with artificial cultures.

(1) We hear a lot from scientific and popular writers about chestnuts here in the north that have practically disappeared through the blight, the possibility of resistant trees surviving from which new forests might be established, and the likelihood of the blight dying out so that the surviving seedlings and sprouts may escape final destruction. I wish to record my opinion concerning these statements as follows:

We certainly have no healthy old trees and practically no living diseased ones in Connecticut. In 1927 we heard of what seemed to be one of the last of these old trees. Various newspaper articles appeared concerning this tree of which the following is a sample: "It is one of the few trees of its kind in New England, -- that is, it regularly yields a good crop of chestnuts. It is so important to the forestry experts that they purpose making an effort to save the nuts for seed, in the hope that chestnut trees can again be grown in New England and made a source of profit to farmers. In order to prevent the nuts from being carried off by squirrels, it is purposed to enclose the tree with a fine mesh wire, with a screen at the base to catch whatever burrs may fall. Why this tree at Woodville managed to escape destruction no one knows."

Neither did it escape destruction. With Mr. Filley and the owner we visited the tree that fall and much to the owner's surprise this supposedly fine tree had gone back since he had seen it the previous year. All that was left living was a piece of bark about a foot wide on the north side of the tree extending about half way up the trunk where three branches, about three inches in diameter, were still alive but infected and one branch, one inch in diameter, that seemed to be free. All told there were four chestnut burrs on these living branches. The tree apparently could not survive more than another year at the most.

However, this was not the last old tree that survived in this state, since even this fall we again saw another old tree, two feet across, that had a similar but narrower streak of living bark on the north side from the end of which, near the middle of the tree, proceeded three small branches bearing one to two hundred living leaves. This dead-living tree, too, is doomed shortly, so we can safely say that all the old trees are dead or

practically dead and there is no hope of propagating new trees from them in Connecticut.

As regards the sprouts from old trees, I make the following statement. There are few sprouts on dead trees that have been left standing. Sprouts from the cut stumps are not so large or numerous as a few years ago. The largest sprouts that I have found, either infected or healthy, are not over four or five inches at the base or over thirty feet, at the most, in height. I have, however, seen a few sprouts, both infected and healthy, about this size this year. Because of the disappearance of the old infected trees and the lesser number of infected sprouts, we occasionally find where just one or two sprouts survive that they have succeeded in escaping infection. Furthermore we find that, because of the scarcity of trees and sprouts, the blight fungus is very much more limited in its development and so there is less likelihood of its spread to the still living healthy sprouts.

As regards seedling chestnuts we still have a fairly large number in our woods. Like the sprouts the largest ones, either infected or healthy, are four to five inches in diameter at the base, and about twenty to thirty feet tall. These large seedlings, however, are few in number. The small seedlings, one to six feet tall and less than half an inch in diameter, are still present in considerable numbers. This year I found that most of them seem to be quite vigorous and often free from blight. It is to these younger and more isolated seedlings that I look for the survival of the chestnut, because of the lessening opportunity for infection and the possibility that the blight itself may gradually lose its virulence as a parasite.

As to the so-called resistant trees in nature, I do not look for help. I have never seen what I would call a resistant tree or seedling and all of the trees that have been called to our attention have been either (a) some other tree than the native chestnut, such as horsechestnuts, etc., (b) Asiatic or other species that are known to have more or less resistance to blight, and (c) native trees that while they have outlived other trees have finally died.

(2) Because of enquiries concerning what would happen to the chestnuts when the blight began to decline and the likelihood of planted seedlings escaping infection when this occurred, the writer and Mr. Filley in 1924 began to buy chestnuts from the south for growing seedlings. Most years since that time we have planted the nuts at the Station in the fall, leaving them there for a year, and then have transplanted the one-year seedlings in five selected localities in different parts of the state where chestnuts have died but where the sources of infection were perhaps less than usual. The first lot of seedlings were set out in the spring of 1926. In 1927, there were also planted about one thousand; in 1928, over thirteen hundred; in 1930, approximately five hundred. This fall a new lot of seeds has been obtained for germination next spring.

The results of these experiments so far have been as follows. We lost about half of the nuts through worms contained in them before being placed in the seed beds. The seedlings were planted in the field by the ordinary forestry method of making a hole with a mattock every three feet,

placing the wet roots of the seedling in the same and tramping down the earth with the feet. We found that a large percentage failed to survive a year because of dry weather, competition, etc., so that eventually, with at least two drought years, less than 40% of the seedlings now survive. So far we have found very few killed by the blight and we doubt whether the blight will be much of a factor until the seedlings obtain considerable size. Finally the growth of these seedlings has been very slow even those now out five years. In some cases the latter are not much larger than those recently put out. Those planted in the open or under too much shade have on the whole done poorer than those with moderate shade.

(3) We have had in culture a number of years, the three saprophytic relatives of the chestnut blight, Endothia radicalis, E. gyrosa and E. radicalis var. Mississippiensis and also various cultures of chestnut blight, E. parasitica, that have been grown artificially from one to twenty-one years. We wished to learn if carrying these fungi in artificial media affected their parasitic or saprophytic nature when they were inoculated in chestnut seedlings. Consequently this summer we tried them out using five to ten plants for each inoculation, with a similar number of checks, of the four fungi. All of the checks remained healthy and also all of the plants inoculated with the three saprophytic fungi. With the chestnut blight, the chestnuts inoculated with the two cultures grown saprophytically for seven and twenty-one years also remained healthy; while with those inoculated with the recently obtained blight cultures, one two years old and the other less than a year, every inoculated tree took.

If we can duplicate these results with these and other old cultures of the chestnut blight, to be sure of no error, we can then claim that continued culture as a saprophyte causes the chestnut blight to lose its virulence. If this is so, then may we not expect that the same thing might gradually occur in nature, and thereby have some hope that the chestnut may again come back, as it did over a hundred years ago, following the unknown trouble that killed many of the trees in the south.

White Pine Blister Rust, Cronartium ribicola.

I have previously told you of Dr. McCormick's and my work on the blister rust. We showed how infection takes place through the needles (chiefly the one, two or rarely three year old needles) in nature in the fall and how the fungus works down through the fibrovascular system into the stems where later it breaks out as the first evidence of infection to the casual observer. We got so far that we were able to observe, under the microscope, where infection had taken place in the leaves which had been exposed to the germinating sporidia only from one to three days. In indoor inoculation the first sign of infection to the naked eye is not seen before one or two months; while outdoor natural infection probably does not show until the following spring. We also found similar results of needle infection due to our other common pine stom-rust, known as Cronartium comptoniae, which infects a variety of pines.

We also showed to our own satisfaction, and I hope to others, that the white pine rust could, at least artificially, infect other than five needle pines, such as those having two and three needles. The only reason that these other species are not attacked in nature is, to my mind, be-

cause they are not often associated with Ribes producing telial infection, or perhaps they are and the botanist finding such an infected pine calls it by some other rust name.

We found in these artificial inoculations with young pine seedlings that there was a great difference in susceptibility to this rust. Of the 28 different species of pine used there were ten that failed entirely of infection. There were seven species where we got poor leaf infection but which failed to grow further. There were six species that gave fair leaf infection but were doubtful as to stem infection. These were as follows: Pinus lambertiana (5 needles), P. tuberculata (3), P. laricio (2), P. ponderosa (3), P. sabiniana (3) and P. insignis (3). There were, however, four species, other than Pinus strobus, where good needle infection was followed by evident stem infection. These were P. canariensis (3), P. pinea (2), P. coulteri (3) and P. edulis (3). With these last species we were also able to develop pycnia and pycniospores on the stems and to carry them along usually as far as we could with the white pine.

Pycnia, with spores, were sometimes produced when the infections were less than a year old. However, we were never able to produce the aecial stage, even on the white pines, when the seedlings were kept for observation for two or three years and even longer. We are not quite sure of the reasons for this; possibly it may have been because the seedlings were often killed by too many infections. On the other hand we have often wondered whether or not there was some unknown factor, like artificially mixing the pycniospores together from different infections, such as has recently been shown to be usually necessary when barberry leaves are artificially infected to produce aecidia.

My chief reason for discussing the blister rust here, however, is to call to your attention some of the factors that favor or prevent pine infection in nature as well as in the laboratory. You are all aware certain years are much more favorable for pine infection that others. It is quite doubtful if general infections occur on the average more frequently than once in four years. Observers have aimed to determine approximately those years by counting the number of internodes that have developed above the cankered areas.

We know that, besides the presence of both the alternate hosts, we must have the Ribes infected with the telial stage fairly near the pines. We know that certain Ribes, like cultivated black currants, are likely to produce the telial stage in abundance all over the leaves; that other Ribes, like the skunk currant, are often produced in great abundance in infected localities. Besides these susceptible and abundant Ribes, we need certain weather conditions to favor the germination of the telia, the production of a maximum of sporidia, and the carrying of these under favorable conditions to the pine needles where their germination is also favored. We know also that these conditions must occur, ordinarily, sometime between the middle of August and the middle of October. These weather factors are optimum conditions of moisture and temperature, and favorable safe winds as the carrying agents. It is likely that these conditions do not generally exist during the late summer and fall. The

year that gives one or more favorable infection periods of this nature is the year that produces the most rust cankers on the pines. I understand from Riley that he considers this as such a favorable year.

Yet knowing these factors we have not succeeded in producing uniformly successful artificial infection experiments. We have apparently gained little from experience, since our last attempt was the least successful of any of our inoculations. We have frequently missed some important factor. No doubt it was at times because our infection material was in poor condition, such as too old telia or too little in amount. Again it might have been because we kept the Ribes leaves too wet or the pines too dry. Or we may have lacked air currents to carry the sporidia from the currant leaves to the pine needles. Our chief trouble, however, we believe to have been too high temperatures. Usually we infected the pine seedlings under bell-jars, placing the infected Ribes leaves in various ways above them, and tried to keep the jars moist and exposed to daylight.

This fall we again tried to see if we could be more successful than nature seems to be. We have exposed two lots of seedlings of eighteen different species of pine. These were all this year's seedlings grown in crocks, each crock containing from one to several or in a few cases as many as forty young plants. We have designed a Wardian glass case containing a humidifier, to send out ample atmospheric moisture, and a Frigidaire cooler, to reduce the temperature as low as 50 F. degrees., if necessary. We have placed the crocks of each set at different times in the bottom of the case, atomized their leaves with water occasionally, and on a wire rack over them placed an abundance of black currant leaves containing telia in prime condition for germination. We turned on the humidifier to germinate the telia and afterwards turned it off to dry out somewhat the leaves. We have introduced artificial air currents to blow the sporidia down on the pine needles. All we have to do now is to await results for the infection spots to appear. If these fail on the susceptible species of pine, I shall conclude that while I may be a scientist, I am at least a poor practitioner, even worse than old mother nature who has to consider both the pines and the Ribes as well as the rust.

Willow Scab, *Fusicladium saliciperdum*.

Let me conclude with a few words concerning the willow scab, a subject on which I have spoken to you before. This, too, is in collaboration with Dr. McCormick. I, and others, have found this disease in many places in all the New England states, though least prominently in Rhode Island. We found it in Quebec, beginning half way between New Hampshire and the city of Quebec, and from there all the way along the St. Lawrence river, and up around the other side of the Gaspe peninsula; also in many places in New Brunswick, Prince Edward's Island, Nova Scotia proper, and Cape Breton Island. Great damage has been done in some of these Canadian provinces where the willow is a common street and shade tree. In New York it has been found by observers in various places as far west as Ithaca. I have also collected the disease from one place in England.

We have cultures of the fungus made from leaves from many of these localities. In 1929 and especially in 1930, due to the droughts, the disease seemed to be going into a decline but this year, due to the wet spring, it has come back again with considerable vigor.

The yellow twig willow, Salix alba var. vitellina, is the chief shade tree that has suffered, so that in some localities the tree has been practically annihilated. We have seen little injury to the white willow, S. alba, and none to the true weeping willow, S. babylonica, although it has done some damage to Thurlow's weeping willow, S. elegantissima. S. cordata, the common shrub willow along streams, is also a favorable host.

We have found definite infection of the twigs in early spring, producing conidia before and when the leaves were coming out. We have seen infection of the young leaves immediately below these infected twigs, thus showing how the fungus carries over the winter. We have never been able to find the mature Venturia or ascostage on the old leaves, though we have searched for it here and in Canada. We did, however, find a true Venturia on dead willow leaves that we thought might be this stage, but when Dr. McCormick succeeded in making cultures it produced a saprophytic Cladosporium as its conidial stage. I am wondering if this is the Venturia that Aderhold and others have described in Europe as its mature stage.

We have tried all sorts of ways to secure the Venturia from our cultures of the Fusicladium which came from the diseased willow leaves. We have sought this because there was frequently a tendency of the cultures to form what seemed to be immature perithecia. Many one-spore cultures have been crossed with others and with mixed cultures from a variety of sources without any definite results. Finally by mixing cultures from the north and south and keeping them under cold conditions for many weeks, we succeeded in a few cases in producing a limited number of perithecia and mature ascospores. These ascospores differed from those produced by the saprophytic Venturia found on old willow leaves in nature and from those figured by Aderhold. They agreed more nearly with the ascospores figured by Aderhold as being characteristic of the poplar scab, to which the willow scab is the most nearly related of any of our Fusicladium species.

In conclusion we can state that we have also isolated cultures of the Physalospora disease of the willow that British writers believe to be the cause of the willow disease. We have this fungus obtained from native willows gathered in Japan, Canada and New England. We do not deny that this is a parasite, probably more of a real parasite than the Fusicladium, and that it may cause infection of willow twigs and leaves, more particularly the mature leaves. Yet we believe that both Matrass of England and Dennis of Scotland are mistaken when they say that Fusicladium saliciperdum cannot infect living willows. Further we believe that the latter fungus is the chief cause of the willow disease, since it is the very young leaves during wet weather that are killed when they first come out or while young and still growing. It is this destruction that causes the death of the willows and not a later canker and leaf-spotting fungus which may be largely due to the Physalospora.

So far we have secured a greater amount of infection from the Fusicladium than from the Physalospora, though the abundant spore production of the latter should favor a greater degree of infection. Finally there is the matter of the similar poplar disease caused by the closely related Fusicladium radiosum, for which no one has yet isolated a Physalospora as the cause.

Early spraying is the chief remedy against this disease, but it is rather expensive since it requires four to five sprayings to control it after the fungus once gets a fair start on the trees. Our four sprayed trees at Norfolk are the only ones in their immediate vicinity that are still alive, but this year they have the disease abundantly because they were not further protected this spring by spraying.

OBSERVATIONS ON THE RESEEDING OF RIBES NIGRUM

By E.T. Littlefield, Acting Supervisor Forest Investigations, New York Conservation Department.

Inspection in 1931 of some thirty places in New York State where Ribes nigrum bushes were pulled in 1930 indicated that seeds of Ribes nigrum will germinate readily where conditions are favorable, and that the seedlings will live over the first winter. In one case where several hundred of these seedlings came up in 1930, seventy per cent were living in 1931 and had in some cases reached a height of nearly a foot by the end of the second growing season.

The fact that Ribes nigrum seedlings are not commonly found after the initial eradication would seem to be due to some outside factors, particularly, to disturbance of the site following eradication.

Ribes nigrum was found to have become locally naturalized in pastures and woodlands in Chatauqua County. This species has been under cultivation in the towns of Charlotte and Cherry Creek at least 50 and probably nearer 100 years, and with the gradual abandonment of the farm lands there has been a considerable period during which it has had an opportunity to become established.

In view of the observations cited here and the fact that Ribes nigrum has been found outside of cultivation in several other localities in New York State, it seems to me that we shall have to revise our ideas somewhat regarding the ecology of this species.

PAPERS ON SPECIAL SUBJECTS

THE PRODUCTION OF FIVE-LEAFED PINE PLANTING STOCK UNDER SPECIFIED SANITATION CONDITIONS

By: R. A. Sheals, Associate Plant Quarantine Inspector,
Plant Quarantine and Control Administration.

The production of nursery stock under sanitation conditions which tend to assure freedom from or control of injurious insect pests and plant diseases is sound economic policy. The removal of weeds, debris and other materials which constitute the normal hiding or breeding places of insects, supplemented by the use of insecticides such as poison sprays, contact sprays and repellants has assisted materially in the control of such pests. The methods of sanitation practice used to raise nursery stock as nearly free from plant diseases as practicable are numerous and depend to a great extent on the nature of the disease to be combated. At this conference we are primarily interested in nursery sanitation as it relates to the production of five-leafed pine planting stock under prescribed Ribes-free conditions.

Sanitation Conditions as Specified in Regulation 2(d) of the White Pine Blister Rust Quarantine.

Pathologists have determined that the removal of all currant and gooseberry plants for a distance of 900 feet and all European black currant plants for a distance of one mile from a five-leafed pine stand gives such pines adequate protection from blister rust, under average conditions. It is admitted that under such Ribes-free conditions occasional pines may become infected but the loss of a small percent of pines in a forest stand is not a serious economic factor.

With respect to five-leafed pine planting stock such commercial protection is, however, not deemed adequate. More careful inspection of the pines and more intensive elimination of Ribes plants of all sizes and species is necessary. The objective is 100% freedom from blister rust, and the restrictions recommended by the Division of Blister Rust Control, Bureau of Plant Industry, and incorporated in the quarantine as conditions under which five-leafed pines may be moved interstate from the generally infected to the lightly infected States are planned to accomplish that purpose. They are given as follows in the quarantine regulations:

"That such movement shall be confined to five-leafed pines grown from seed in a location within one mile of which there have existed since the time of planting said seed no European black currant plants and within 1500 feet of which there have existed since the time of planting said seed no currant or gooseberry plants of any size or variety which in the judgment of the inspector would involve risk of spread of white pine blister rust."

Pine-Shipping Permit Required

Nurserymen or others who desire to ship five-leafed pines under the conditions specified above are required to make application for a pine-shipping permit to the Plant Quarantine and Control Administration in advance of the

time of planting the seed. This requirement is mainly a matter of protection to the applicant because otherwise the seed might be planted in an area which on account of a Ribes condition could not be approved. The application must give the location of the premises upon which five-leafed pines will be grown and the applicant must agree that no five-leafed pines will be grown in or distributed by any nursery or nurseries owned or controlled by him except such as are maintained in compliance with the sanitation requirements of the quarantine quoted in the previous paragraph. However, in case of nursery properties under single ownership and management but represented by units widely separated, such units may be considered as independent nurseries and pine-shipping permits may be issued for one or more such individual units. The agreement is designed to obviate the possibility of non-certified pines being shipped under a pine-shipping permit. It is obviously impracticable to assign a special full-time inspector to remain on the premises of each nursery to distinguish between pines on the premises eligible for shipment to lightly infected States and those ineligible for such shipment. Therefore permittees are not allowed to grow or handle any white pines which have not been grown under the sanitation conditions prescribed.

Cooperative Inspection

The initial eradication of currant and gooseberry plants in the nurseries of applicants and in the prescribed 1500 foot and mile zones and the annual spring check to eliminate any seedlings and sprout growth have been done, in most instances, under the supervision of an agent of the Division of Blister Rust Control. The final inspections of the nurseries and the zones are made by an inspector of the Plant Quarantine and Control Administration. There is close cooperation between the Division of Blister Rust Control, Bureau of Plant Industry and the Plant Quarantine and Control Administration in this inspection of five-leafed pine-growing nurseries. On September 4, 1929, Dr. C. L. Marlatt, at that time Chief of the Administration submitted to Dr. W. A. Taylor, Chief of the Bureau of Plant Industry, a program for the coordinating of the control activities of the Division of Blister Rust Control and the regulatory activities of the Administration with respect to the nursery sanitation provisions of Regulation 2 (d) of Quarantine No. 63. This program as approved by Dr. Taylor is as follows:

(1) Upon receipt of applications for pine-shipping permits under the requirements of that regulation, the Plant Quarantine and Control Administration will notify the Bureau of Plant Industry of the name of the applicant and such other information as is given in the application.

(2) The Bureau furnishes the Administration with information already in its possession, or such as can readily be secured from the field organization, as to (a) any blister rust infection record in the nursery in the past, and (b) the conditions in the nursery and environs with respect to the presence or absence of Ribes within the 1500-foot and one-mile zones, respectively.

(3) If the Bureau reports to the Administration that Ribes or blister rust infection are now present in the nursery or within the environs, such as to prevent the nursery from complying with the requirements for a pine-shipping permit, the application is refused or withheld without further inspection by the Administration. The Bureau of Plant Industry is, however, at liberty to undertake Ribes eradication in the vicinity of the nursery if such action is requested by the proprietor or the State nursery inspector.

If eradication is carried on, the blister-rust State leader arranges to submit a report and a map of the Ribes eradication area. Such reports and maps are prepared in quadruplicate. Copies are submitted to the Plant Quarantine and Control Administration, to the nurserymen, to the State inspectors, and a copy remains in the State leader's files.

(4) When it appears from the records of the Bureau of Plant Industry that the applicant's nursery and the environs are apparently in such condition that the issuance of a permit is warranted, the Administration makes a thorough inspection and if the nursery and environs are found to comply in full with the quarantine restrictions, a pine-shipping permit is issued, and the Bureau of Plant Industry notified accordingly. When making such inspection, the Administration, whenever feasible, notifies the State nursery inspector and the blister rust leader so that they or other agents may be present when such inspection is made.

(5) When the Bureau finds that it has not, and cannot readily secure, sufficient information as to conditions in the nursery of any applicant or in the vicinity of his property to make a report on the subject, the Administration in a similar manner makes the necessary inspection and notifies the Bureau as to the results.

In those instances in which permits are refused on account of the presence of Ribes discovered by Administration inspectors, the Bureau is supplied full information by means of reports supplemented by maps showing Ribes locations in order that it may provide for any new cooperative work with the nurserymen concerned which appears to be necessary or desirable under the circumstances.

In the meantime, it is understood that the Bureau of Plant Industry will take the responsibility for any general educational work with nurserymen or others which may be needed with respect to Ribes eradication methods and costs.

Method of Inspection by Plant Quarantine and Control Administration.

Perhaps a brief statement covering the method of the Administration's inspection of the nurseries and environs of applicants for pine-shipping permits will be of interest to those attending the conference.

Any blister rust control agent knows that it is practically impossible for one or two inspectors within a reasonable length of time to detect every Ribes plant that may be growing within a 1500-foot zone of the average nursery tract. The inspectors designated by the Administration for this work, however, have had blister rust field training and they should be able to detect any Ribes plants which are of such a size or are growing in such close proximity to the pine plants as to constitute a menace to the pines. In this inspection work all swampy places, fence lines, roadsides and abandoned house sites are very thoroughly covered by the strip method ordinarily used by blister rust crews.

Any land which because of its nature is considered as a non-Ribes area is covered in much the same manner that an advance scout goes over such

types of ground. The results of this inspection and of the initial inspection by Blister Rust agent form the basic information on which the application for control area permits are approved or denied.

This nursery sanitation work must at the present time be considered as an experiment. It was not known in advance, first, whether the environs of nurseries could be freed completely from Ribes, nor, second, whether the degree of Ribes freedom which could be obtained would be sufficiently high to ensure the production of blister-rust-free white pines. It is a well known fact that Ribes seed are distributed by water courses and birds and that the seed lies dormant and viable in the soil for long periods of time. When the duff or humus is distributed and soil conditions are favorable the seeds germinate. Therefore, these conditions plus the fact that the human factor is necessarily involved in the inspection of the nursery and environs makes it necessary to gain experience over a period of years before we can be sure that five-leafed pines can be raised under blister-rust-free conditions. In practice, it has been found that repeated eradication work must be done each spring in order to take care of sprouts and seedlings. None of the nurseries have as yet obtained a sufficiently stable degree of Ribes elimination to justify the discontinuance of this annual spring reeradication operation by the Bureau of Plant Industry or the nurseryman in advance of the Administration inspector's visit.

State Inspection and Certification of Five-leafed Pines As a Condition for Interstate Shipment.

At this point, it seems desirable to distinguish between State and Federal responsibility on this problem. Under the plant quarantine act, the Secretary of Agriculture is given power to place such restrictions as may be necessary to prevent the spread of plant diseases to uninfected localities. The protection of purchasers of nursery stock within infected areas is primarily a function of the State nursery inspectors. Federal quarantine No. 63 thus places its own stringent restrictions on the shipment of white pines from generally-infected to lightly-infected areas, but authorizes such shipments between generally-infected States on the basis of a State nursery inspection certificate only. The inspection of the nurseries and environs made as a basis for the State certification required by State laws as well as by regulation 2 of the Blister Rust quarantine should give the purchaser of the stock substantial protection against the receipt of blister rust infected trees even though possibly such State regulations are not made quite so rigid as the Federal procedure outlined above. During the past few seasons several shipments of five-leafed pines, which were later found to be 10 to 15% infected with blister rust, were shipped into Rhode Island from another New England State. The shipment was made in compliance with the regulations of the Federal quarantine in the fact that a valid State nursery inspection certificate had been issued to the nursery concerned, but it is clear that the inspection upon which State certification was based was not adequate. It is suggested that the State nursery inspectors of the generally infected States should take a higher degree of responsibility than possibly they are at present when considering the certification of white pine nursery stock. Is it fair to the purchasers of such stock for the inspectors to go through a block of white pine, remove visibly infected trees and certify the rest?

Necessity for Continued Close Cooperation Between Agencies Concerned

It is very evident that, if the enforcement of the blister rust quarantine regulations fails to accomplish its purpose of preventing the spread of the disease by means other than the natural spread, the efficiency of the blister rust control work of the Bureau of Plant Industry in cooperation with the States will be materially reduced. On the other hand, if control measures are not successfully applied, the effectiveness of quarantine enforcement will be nullified. Therefore, there should be continued close cooperation between those agencies of the P.Q.C.A., of the B.P.I., and of the States concerned who are enforcing the quarantine and carrying on the research and control activities, respectively.

With respect to the nursery sanitation work in and around five-leafed pine nurseries, it is believed that further cooperative measures may be undertaken which if successfully carried out, will give added protection from blister rust attack to five-leafed pines grown in accordance with the requirements of the quarantine which have been referred to in this paper. The following suggestions are, therefore, made:

1. That the blister rust agents who supervise the eradication work in and around pine-growing nurseries recognize the necessity for more intensive Ribes elimination than that considered necessary for the protection of commercial stands of five-leafed pines.

2. That the initial eradication work and the annual check-up be done early in the spring when the ground is not covered with dense vegetation and that the members of the crew be spaced not more than 5 feet apart in swamps or other areas favorable for Ribes growth.

3. That the outer edge of the 1500-foot zone be marked with paint or in some other manner so that a definite boundary is established.

4. That the agent, who supervised the work in and around a nursery be present when the inspector of the P.Q.C.A. makes the final inspection.

5. That a representative of the Division of Blister Rust Control accompany the Administration inspector on the entire nursery inspection trip.

The Plant Quarantine and Control Administration desires to cooperate in every practicable way with the Division of Blister Rust Control not only in adapting blister rust quarantine regulations to meet present day conditions but also in developing the appreciation of the value of white pine, by insuring that the purchasers of pine nursery stock can obtain disease-free trees, whether such trees are to be planted in infected areas or not. Your constructive suggestions are always welcomed.

Discussion

Messrs. Perry (Mass.), Riley (Conn.), McIntyre (N.Y.) and Mandenberg (Mich.) participated in a discussion of this topic. Mr. Sheals stressed the point that the work of "Transit Inspection" was built by men recruited from the ranks of the blister rust control organization. To Mr. Detwiler, he said, is due the credit for instituting this important service.

THE SPREAD OF BLISTER RUST IN THE SOUTHERN AND CENTRAL STATES IN 1931.

By Roy G. Pierce, Associate Pathologist, Division of Blister Rust Control.

The season of 1931 was favorable for the extension of the blister rust east of the Rockies. Scouting was begun on July 16 by Messrs. S.B. Detwiler and H.H. Putnam in northern Maryland and within one half day the disease was discovered by them on Ribes at Shady Bower near Clear Spring in Washington County. Additional infections on European black currants (Ribes nigrum) and yellow flowering currant (R. aureum) were found at this time at two separate locations, both within 4 miles of Clear Spring. Later in the season, from August 18 to September 16 scouting was carried on by Messrs. L.W. Hodgkins, H.P. Avery and C.T. Geiser. Three separate infections were found in the South Mountains in eastern Washington County: within 4 miles of the Maryland Pennsylvania line, infected roundleaf gooseberries (R. rotundifolium) being found at three places and infected white pine (P. strobus) at one place, and a fourth infection was found on Ribes aureum at Big Spring, 2 miles south of Clear Spring. It is thus seen that two large centers of blister rust were found in 1931 in Washington County, one centering on Clear Spring where four separate rust locations were found within 4 mile radius and one centering around Edgemont at the eastern edge of South Mountain where three rust locations were found within a two mile radius.

In Alleghany County the men located blister rust at six places within a 3 1/2 mile radius of Frostburg, at 4 places on Ribes nigrum only, at one place on R. nigrum and R. sativum Schoch, and at one place on R. cynosbati.

Following the location of the blister rust in Maryland came the scouting for and location of the blister rust in West Virginia and Virginia by Messrs. Hodgkins and Geiser. In West Virginia the rust was found on the roundleaf gooseberry (R. rotundifolium) on September 1, 3 1/2 miles northeast of Thomas in Tucker County, and on September 2, 2 7/10 miles south of Alpena in Randolph County. This latter infection was within the boundary of the Monongahela National Forest. In Virginia, they located the blister rust on R. rotundifolium on September 9 near Star Tannery in Frederick County adjoining the Shenandoah National Forest and on September 12 at Thornton Gap in Rappahannock County about 8 miles east of Luray. This latter location is within the proposed Shenandoah National Park.

The scouting west of Pennsylvania was carried on during August by Messrs. R. A. Sheals of the Plant Quarantine Administration and R.G. Pierce of this Division. In only two states could the disease be located; namely, in Ohio and Iowa. In Ohio the rust was found in Ashtabula County at three places; on August 5 on R. cynosbati near Williamsfield, and on R. nigrum at 2 places near Monroe Center; in Geauga County August 28 on R. nigrum a few miles east of Montville; and in Fulton County August 6 on R. cynosbati 2 miles east of Fayette. The Ashtabula County infections were within 6 miles of the Ohio-Pennsylvania line, while the Fulton County infection was within 2 miles of the Ohio-Michigan line.

In Iowa the blister rust was found August 20 on a small white pine in a nursery at Ames in Story County, about 1/3 mile distant from a row of 20 European black currants which were infected with the blister rust in 1929.

Mr. Sheals located the 1929 infection, but because of the fact that it was in the telial stage on R. nigrum the Division of Forest Pathology to whom the specimens were referred, could not positively identify them as being infected with Cronartium ribicola.

In all, five new states have been added this year to the list of 12 Eastern States known heretofore as being infested with the blister rust.

REPORT ON BLISTER RUST INFECTION IN WHITE PINE PLANTATIONS ESTABLISHED DURING 1929 AND 1930 IN RHODE ISLAND WITH STOCK FROM AN OUT-OF-STATE NURSERY.

By A.W. Burford, Blister Rust Control Leader, Rhode Island.

In carrying on annual reforestation campaigns the Bureau of Forestry of the Rhode Island Department of Agriculture pooled and placed orders for approximately 76,830 white pine with an out-of-state commercial forest nursery in 1929 and 1930. The stock, ordered for eleven individuals and agencies in 1929 and for five other individuals and agencies in 1930, was guaranteed by the nursery to be healthy and vigorous, and, according to the nursery, pronounced free from blister rust by the State nursery inspector. Rhode Island officials concerned with reforestation, not knowing the conditions at this nursery, relied on the guarantee of the nursery and the certificate of State inspection in ordering stock. Only a few commercial nurseries in New England grow white pine suitable for forest planting for sale at reasonable prices. Choice in the placing of orders is therefore limited. The small number of trees looked over by officials of the Rhode Island Department of Agriculture during the planting periods in 1929 and 1930 appeared healthy and vigorous, but no thorough inspection was made of the stock, since there was no suspicion that blister rust was present.

In the early part of April 1931 a white pine plantation owner in Rhode Island, reported to the State White Pine Blister Rust Control Leader that he had found blister rust infection in a plantation of white pine established in the spring of 1929 with stock received from the nursery previously referred to. This man had, in the past, cooperated with the State Leader and through reading blister rust literature and seeing colored pictures of the disease, he was familiar enough with blister rust to identify it in his plantation. The State Blister Rust Control Leader was making plans to scout white pine areas in Rhode Island with Mr. L.W. Hodgkins, Agent, Division of Blister Rust Control, United States Bureau of Plant Industry, to determine if new pine infection areas existed. The fact that one white pine plantation established with stock from this nursery had blister rust led the State Leader to believe that disease might be found in other plantations established with stock from the same source. Therefore while waiting the arrival of Mr. Hodgkins a study was made of the state's reforestation records

and it was noted that sixteen different individuals and agencies had obtained white pine from the same nursery in 1929 and 1930. Mr. Hodgkins and the State Leader shortly afterwards, in the early part of April, 1931, located and made a cursory inspection of the sixteen white pine plantations established. Blister rust infection was found in all of the plantations.

The nursery officials were notified by the State Entomologist in Rhode Island not to ship any more white pine into the state until further notice. The Plant Quarantine and Control Administration and the Division of Blister Rust Control were notified at once of the fact that white pine infected with blister rust had entered Rhode Island as interstate shipments of white pine nursery stock. Mr. Hodgkins was assigned by the Division of Blister Rust Control to work with Rhode Island officials in making a thorough survey of the sixteen white pine plantations and to locate and determine the amount of blister rust infection present. This survey was made during periods in April, May, June, July and August, 1931, with a state crew of three men assisting.

In the open fields the inspection areas were laid out in plots through the use of string and other markers, and care was taken to make a thorough inspection of all the white pine that could be located. Much of the planting had been made in woodlands under hardwood growth. In such areas the men made their inspection by running strips through the woods using trail paper to avoid missing or inspecting trees twice. The inspection of these wooded areas was time-taking and difficult, due to the fact that many of the young pines were partly hidden under brush and other vegetation. Of the 76,830 white pines reported as planted, only 44,939 of the trees could be located for inspection. No accurate figures could be obtained as to the number of trees which had disappeared because of various causes. However, the reports of the planters and general observations indicated that fire, accidental mowing, brush piling and shading out accounted for many of the white pines not found. There is little information on the mortality in newly established white pine plantations to indicate what loss takes place during the first few years. However, the information received shows that the several factors mentioned were to a large extent responsible for the great difference between the number of white pines recorded as planted, and the number of white pines actually found and inspected.

The white pine was all transplanted stock and from three to five years old when received from the nursery. Of the 44,939 white pines found and inspected, 1,355 white pines were found infected with blister rust. An average of 3.015% infection for all the white pine inspected was thus found. The 19,992 white pines planted in 1929 found and inspected showed 782 white pines diseased or 3.9% infected. The 24,949 white pines planted in 1930 found and inspected showed 573 white pines diseased or 2.3% infected. Infection conditions in the white pine plantations established in 1930 indicated to the inspectors that a little more infection probably existed which should become apparent in a year or two. In the different plantations the percentage of infection of the white pines inspected varied from 1.34% to 8.43%. On the 1,355 infected trees found there were 1,373 blister rust cankers with years of origin from 1925 to 1929. Only eighteen of the infected pines had more than one canker. The total number of cankers by years of origin (determined by age of wood on which found) was as follows:

1925------- 1	1927-------662
1926------- 78	1928-------483
	1929-------147

In all cases the cankers originated on wood formed before the white pine was shipped from the nursery. As the fungus incubates about three years before the cankers become readily visible, the trees must have been infected before they left the nursery.

While carrying on the survey blister rust infection was found on wild gooseberries in the vicinity of one plantation where a few fruiting bodies were observed on the diseased white pines. Apparently the infection had spread from these pines to the bushes. Control areas through the eradication of currants and gooseberries were established in and around some of the plantations. Control areas will be established in and around the remaining plantations early in the spring of 1932 to prevent further spread of the disease locally. Fruiting bodies were found on infected pines in several of the plantations. All the diseased trees found were destroyed at once, but the disease already had had some opportunity to spread to Ribes. Local control will be necessary to protect the healthy white pines remaining in the plantations.

Rhode Island forestry officials are concerned more about the ultimate results of planting the diseased stock than in the relatively small amount of damage already reported in the plantations. The establishment of local centers of infection in the sixteen different localities in the State where the white pines were planted and the consequent local spread of the disease, not only increases the amount and distribution of the rust in the State but also enlarges the amount of control work which will be necessary. During the spring of 1932 more work will be necessary to complete the eradication of currants and gooseberries in and around several of the plantings where control measures have not been applied. Also, the local spread of the rust in these areas prohibits the eradication of the disease and requires the application of control measures to other native and planted pines in the affected localities to safeguard them from blister rust damage.

After the completion of the white pine infection survey and the compilation of the data, the nursery officials concerned were informed on September 16, 1931 as to the amount of infection found in the white pine plantations established with their nursery stock. They had already offered to replace the diseased stock with some other species, according to the wishes of the individual planters. It is expected that the nursery will replace with sufficient nursery stock to offset the initial planting cost. However, this will not pay for the cost of investigation and control occasioned by the shipment of diseased stock.

The results of the survey show that a serious condition can be brought about through the establishment of new local centers of pine infection with diseased white pine nursery stock, which upon shipment may appear free from blister rust. The average planter relies on the state certificate of inspection issued by the State nursery inspector and the guarantee of the nursery in ordering disease-free stock. Unfortunately and particularly because the disease is not readily apparent in its early stages, a state certificate of inspection may be given for white pine which is infected with blister rust. The only sure way, therefore, of obtaining disease-free stock, in so far as blister rust is concerned, is to require the sanitation of nurseries growing white pine before allowing shipment. Either nurseries should grow white pine on sites free from currants and gooseberries or else on sites where these bushes are easily and satisfactorily suppressed. The interstate shipment of white pine is the concern of the federal government and any requirements for

the sanitation of nurseries must apparently come through a federal quarantine, as there appears to be no other authority under which a situation of this sort can be handled. The intra-state shipment of white pine is also of importance and should receive state attention.

Discussion:

Mr. Riley (Conn.) said that in Connecticut, the State has requested towns at their annual meeting to approve the placing of their town in the class of control areas.

Mr. McIntyre (N.Y.) believed that the introduction of diseased pine into a State doesn't materially affect the control program.

Mr. Filley (Conn.) was of like opinion.

Mr. Mandenberg (Mich.) however, felt that quarantines do not throw enough protection around the nurseries. He is opposed to any possible movement of infected pines from one State to another.

Mr. Sheals was quite positive that most nurserymen are doing everything possible to comply with Federal regulations.

The blister rust situation in the West - S. B. Detwiler, Principal Pathologist, Division of Blister Rust Control, Washington, D.C.

Mr. Detwiler prefaced his remarks on the western program by saying that there is a tendency to get into a rut. Any work of this character needs new life. There are now 21 infested States out of the 38 that have native white pine. On account of the nature of the blister rust, we are always five years behind in our knowledge of the distribution of the disease. In the Idaho region, the rust is increasing with startling intensity and rapidity. We must fight to maintain the white pines in our forests. Much assistance and help can be given the western control program by analyzing the results in the East and passing the information along through the BLISTER RUST NEWS. As Mr. Posey has recently returned from the West where he has been in close touch with our work, I will ask him to tell you about the situation in that region.

BLISTER RUST SITUATION IN THE WEST

By G. B. Posey, Senior Pathologist
In Charge Western District

In the West there exists two extensive areas of high quality white pines. These are (1) The commerical belt of western white pine in the Inland Empire (northern Idaho, northwestern Montana and northeastern Washington) (2) The commerical sugar pine belt of California and southern Oregon. These two pine regions differ widely as to climatic conditions, Ribes species, and other factors that influence the blister rust problem.

Blister rust is well established in spots throughout the Inland Empire where it is spreading very rapidly due to abundance and high susceptibility of Ribes and to high susceptibility of western white pine. This pine, is several times as susceptible as the northern white pine of the eastern states. Thus far, the rust has not been found on sugar pine in either Oregon or California, though it has been found on Ribes at several points in Oregon within the northern range of sugar pine and its spread through the sugar pine belt will take place as a natural result of the southward extension of the rust. Sugar pine seedlings planted in infected areas in British Columbia indicate that this species is fully as susceptible as the western white pine.

Control work in the sugar pine belt is well advanced in the experimental stages as a result of Ribes eradication experiments begun in 1925. This work has been seriously handicapped by the limited funds available, but we have had the advantage of several years in which to study the problem. The development of practical methods for Ribes eradication is now further advanced in the sugar pine region than it was in either the eastern or western white pine belts at the time the large scale control work was initiated in those regions.

During the past several years our greatest attention has been centered in the Inland Empire (chiefly Idaho) where the rust is spreading very rapidly and indications are that it will be exceptionally destructive. In fact, the damage rate has been so rapid in some instances where the rust has been established for five or more years as to suggest that control work will need to be done within the next ten years in order to save the present pine stands. In the Inland Empire the western white pine is now and will probably remain in the future the backbone of the lumber industry, and timber is by far the most important product of the soil over a great deal of the region. Other species of conifers such as larch and fir give good yields, but lower market prices and higher transportation cost due to greater weight of the lumber of these species leaves only the white pine that can be extensively marketed. The loss of white pine in the Inland Empire would result in a serious economic situation within that region.

When we think of blister rust control in any region, those of us who are in one way or another charged with helping to do the job measure our tasks in terms of what we call "difficulty factors". From almost any angle difficulty factors confronting effective control in the West (Inland Empire) outweigh those for the Northeastern States by about ten fold. Consequently, the per

acre costs for the practical control work in that region has averaged about $3.00 as against about $.20 in the Northeast. The average number of Ribes per acre on the areas worked has been 108 in the Inland Empire as against 9 to 10 in the Northeastern States. All factors considered, the number of Ribes per acre has an outstanding influence upon the per acre cost of Ribes eradication work. However, numerous other factors are important. I will mention several of these that permit some type of comparison between Eastern and Western conditions.

(1) Accessibility of Eradication Areas. In the Inland Empire 50% of the area is accessible only by trails requiring the use of pack stock for the transportation of supplies and equipment, 25% is accessible only by temporary roads which cannot be used in wet weather, while about 25% of the area can be reached by comparatively short hauls from highways or railroads.

(2) Ground Cover: Over a large percentage of the area down timber and heavy brush reduce Ribes visibility and require more time for the workmen to find the Ribes bushes and go over the ground.

(3) Forest Fires: The western white pine belt is in a region of dense forest growth. Dry weather in July and August with midday air humidity as low as 10 to 20%, such as has occurred during the past five years, create a severe fire hazard. In case of fire the blister rust crews are among the first to give service. In bad fire years, although fire time is paid for from fire fighting funds, the fire fighting duty and the interruptions in Ribes eradication work affect the efficiency of the workmen and increase the per acre cost for blister rust control.

(4) Heavy Ribes Concentrations: From 5% to 8% of the area is classified as "stream type", a narrow belt along the streams where the water table remains high. In a great deal of the stream type, Ribes occur in great profusion, in dense tangled mats with many root centers, as a result of natural layering of the stems that are bent down by heavy winter snows. In some places the Ribes growth is so dense that ten good workmen cannot clear an acre of Ribes during the course of a day's hard labor. On such areas attempts to count the bushes show as high as 10,000 to 15,000 bushes to the acre. Needless to say, the cost for doing this work by hand pulling is very high, the work on some acres costing as much as $100.

Under stream type conditions we have been able to greatly reduce the costs of eradication by the use of chemicals. Sodium chlorate applied in aqueous solution has given better results than any other chemical treatment that we have tested. This chemical applied as a 5% to 10% aqueous solution sprayed on the Ribes petiolare bushes gives a very satisfactory kill with one application. There are three important species of Ribes in the stream type: R. petiolare (a wild black currant), R. inerme (a wild gooseberry) and R. lacustre (a prickly stem currant). While the sodium chlorate treatment is satisfactory on R. petiolare it is less effective on R. inerme and R. lacustre. On the latter two species several applications are necessary to kill the bushes, and this necessarily increases the cost. We are continuing investigations for a more effective chemical and a better knowledge of how to use theones with which we have already demonstrated certain degrees of success in killing Ribes bushes.

(5) Man Power. As there is no adequate supply of local labor the workmen are brought in from outside points. Except for the costs of transporting the labor from the hiring point to the points of duty, the West gets a break over the East on labor because there is a decided advantage in being able to use the same men throughout the season, compared to a more temporary use of local labor which is common to working conditions in the Eastern States. Also the men are camped on the areas to be worked and are not made dull by night life. Most of our men are students from the agricultural colleges and they soon learn to do Ribes eradication work well. The pay scale for crew men is about $2.60 per day and keeps for eight hours of good hard work.

In addition to the difference in Ribes eradication difficulties, protection is more difficult to accomplish in the Inland Empire than in the Northeastern States. The Ribes are more abundant and apparently have greater infecting power due to higher susceptibility. Western white pine is at least five times as susceptible as eastern white pine. These factors make it necessary to rush through initial eradication work if we are to save the pines. We are convinced that control is practicable and that it will pay big dividends in the Inland Empire. Only the future can tell to what extent available funds and time will permit its accomplishment.

In the Northeastern States your efficient and effective control program has put 3/4 of the initial control work behind you. Your work has been good and for the most part timely enough to avert serious losses to the pine so that you may now go about the job of maintaining control conditions with a world of confidence regarding its successful future. In the Inland Empire 9/10 of the initial control work is still ahead, and the large scale program for the sugar pine region has not as yet begun. It is our determination to be in your present position ten years hence and at that time we will have plenty to say for the men on the firing line. Whatever the success may be in controlling blister rust in the West a large credit will be due to the founders, directors and workers in the eastern program who blazed the trail in this new field of work and so admirably turned into a successful accomplishment and an everlasting lesson in forest protection what seemed to most of the scientific world to be a hopeless undertaking. That never-fail spirit of the old timers is a most virulent element that grows and grows and today a membership in the blister rust fraternity which it founded and endowed is something to be proud of.

The economics of the blister rust situation in the Inland Empire has been so admirably stated by Mr. Elers Koch in the Journal of Forestry that we are taking the liberty of quoting his entire article.

CAN THE COST OF BLISTER RUST CONTROL BE JUSTIFIED? *

By ELERS KOCH

Assistant Regional Forester, U. S. Forest Service, Missoula, Montana

(Edit. Now that the white pine blister rust has definitely shown its virulence and potential danger in the West, and control methods and costs are known within limits, the huge problem of actually effecting control directs forcible attention to the justification of the expense. The author discusses the business side of control measures for both federal and private forest lands. The government cannot afford not to protect its white pine from blister rust; it is not so easy to demonstrate the business feasibility on private lands. Protection on private land is the most urgent and difficult forestry problem. The author believes large-scale federal acquisition and protection to be the solution.)

There is an old adage that you cannot make an omelet without breaking eggs. I can imagine that the average housewife who is quite accustomed to cracking a dozen eggs for a family omelet would be quite appalled at the number of eggs to be broken into the pan if she were suddenly required to make omelets for a thousand people.

The unaccustomed magnitude of the white pine blister rust control job confronting us in Idaho hits a good many foresters in about the same way. So long as the work went on in a small-scale experimental way we were not disturbed very much, but now that we are faced with an immediate program involving the expenditure of six or seven million dollars in the western white pine region within the next ten years, it behooves those responsible for the program to convince themselves and others that the cost justifies itself as a business proposition. It is not only the cost in dollars that is a bit staggering, but the facing of the physical job of eliminating all the currant and gooseberry bushes on three million acres of wild land is enough to cause one to take several looks at the whole card.

The blister rust control office has estimated from extensive experimental work that Ribes eradication in the western white pine type will average about $2 per acre for the first operation and around 7.5 cents per acre per year for subsequent work.

There has not been the opportunity to observe the destructive effect of uncontrolled blister rust infection on western white pine stands over long periods of time, but the disease is proving to be so much more virulent on western white pine than on the eastern species that the conclusion seems justified that unprotected young stands of pine will be practically destroyed before reaching maturity.

* Journal of Forestry, Vol. 29, May, 1931, pp. 721-723.

Without white pine, profitable forestry in the white pine region of northern Idaho is "sunk." It is a region of high logging costs and high protection costs, and the bulk of its product must be transported long distances to market. The spread in lumber values between white pine and its principal associates, Douglas fir, larch, white fir, and hemlock, has for years been maintained at from $15 to $20, occasionally going as high as $25. White pine alone has made the lumber industry possible in this region. There seems to be no sound reason for believing that this ratio will be altered in the future. The soft pines, with their many valuable properties, are being depleted more rapidly than the great group of species which compete for general construction purposes but which lack many of the soft pine properties.

From the viewpoint of the federal government, committed to the policy of permanent management of the national forests, it is easy to demonstrate that the government cannot afford not to protect the white pine from blister rust. It is not so easy to demonstrate that a private owner not committed to permanent forest management can afford to protect his pine.

A few cost figures will illustrate the point. Suppose we take a 30-year-old stand in the white pine type, which represents about the average age of most areas of second growth in the region. If protected from blister rust such a stand would produce at the age of 100 years, as a conservative average, 30,000 feet per acre, at least one-half white pine. Stumpage values by that time should certainly equal top prices during the last ten-year period, which would be around $10 per 1000 board feet, for white pine and $2 for other species. This would produce a value of $180 per acre, which is considerably less than some areas in the national forests have already brought in the open market.

If the white pine were destroyed by blister rust, the final yield would doubtless be reduced. It would be replaced only in part by other species. The yield might be figured at 20,000 board feet per acre, with a value of $40 per acre.

The cost per acre to bring such a stand to maturity on the national forests would be about as follows:

Original Ribes eradication $2--	
70 years at 4 per cent interest....	$31.14
Subsequent cost 7 1/2 cents per acre per year--70 years at 4 per cent interest.....	$27.32
Fire control 10 cents per year-- 70 years at 4 per cent interest....	36.42
Total.....	$94.88

With blister rust control we have cost at end of rotation, including 4 per cent compound interest $94.88 per acre, stumpage value per acre, $180; net return, $85.12.

Without blister rust control the cost is limited to fire control, which amounts to $36.42 per acre, stumpage value, $40 per acre; net return, $3.58.

In other words, we barely break even without the blister rust control, and with it have a considerable profit over 4 per cent interest.

So much for national forest land. In the case of private land, assuming the land is listed under the forestry tax law of Idaho, we would have to include 4 cents per year taxes, and reduce the final returns by 12.5 per cent for yield tax. Also interest on the land value must be included. About the only market for second growth or cut-over lands is through exchange with the U.S. Forest Service, which might produce a value of $2 per acre. The cost and returns on private land would be as follows:

Blister rust and fire control, same as national forests	$94.88
Taxes 4 cents per year with 4 per cent interest for 70 years	14.57
Interest on land value of $2-- 70 years at 4 per cent	29.14
Total	$138.59
Returns, $180 less 12.5 per cent	$157.50
Net profit over 4 per cent	$18.91

The private land in this example will thus yield a little better than 4 per cent compound interest, if protected from blister rust. Without protection it would be useless to hold such lands. Much of the privately owned land in Idaho will produce considerably better yields than the figures used, and there is always the chance that white pine stumpage may be worth double the amount assumed. Immature stands older than 30 years will of course make a better financial showing, and younger stands not so good.

The Forest Service is definitely committed to a program of Ribes eradication over the major portion of the white pine type in the national forests of Idaho and western Montana. The 10-year plan provides for treating 1,293,000 acres at an estimated cost of $3,377,000. Appropriations for 1930 amount to $195,000, which will permit a large-scale operation.

The prospects for protection of 1,200,000 acres of private land in the region are none too good. Several of the larger timber land owners are embarking on a blister rust control program in cooperation with the federal government, but there is a vast area including some of the best white pine land in Idaho which is held by owners who are definitely not in the timber growing business, on which prospects for control work are not promising. The ultimate disposition and protection of this land is the most urgent and difficult forestry problem in the Inland Empire region. Protection of this area from blister rust is even more pressing than protection from fire. The loss from fire is only an annual toll, but a few years of uncontrolled blister rust infection may do irreparable damage to all of the young white pine in this region. The only solution which appears to be possible within the limited time available is a large-scale program of federal acquisition and protection.

Functions of the Office of Personnel and Business Administration

W. N. Rehlaender, Assistant to the Director.

Introduction.

You often hear comments regarding the relations of the Personnel in Washington and in the field. There are vague intimations that all field employees are afflicted with that mysterious malady called "Extension Heart," caused by the patient's rushing pell-mell from ox-cart, car, or train to aeroplane to keep his appointments, while in Washington employees are doped with a disease known as "Executive Hips", a condition that arises from the persistent position of the patient.

Many Washington employees are former field men and likewise many employees now in the field formerly served in Washington. I think these men will affirm my statement that no one group has a monopoly on ambition, or the desire to promote the Department's program in behalf of American Agriculture.

The administrative officials in Washington are supposed to see the whole picture, whether it be the picture of scientific research, extension, road building, disease control, or forest fire prevention. A field station, on the other hand, was originally established for a central and more limited purpose, the field employees consequently are concentrating their energies more than some of the Washington men. But even in Washington many of the men are working on a single project, so there too we have some whose business it is to see the whole picture and some whose business it is to seek out the exact scientific truth of a single segment of the whole program.

This condition is true in Personnel and Business Administration. We have some 1,200 field stations. Each sees its own pressing problem. The Office of Personnel and Business Administration tries to see the problem of all 1,200 stations. Now from time to time a station at Mandan, North Dakota or at Amarilla, Texas, or at Boston, Mass. will develop some new procedure in administering its personnel or business affairs. We would not expect the station at Mandan to take the initiative in introducing that new practice into the hands of all field administrators, But if he will pass his suggestions on to Washington we will do that job for him. Indeed Dr. Stockberger hopes as time goes on that the new Administrative Bulletin will perform that very function.

You may develop an improved filing system, or have worked out a difficult problem in conducting your administrative duties; you may find that certain provisions of the Civil Service Laws, or Administrative Regulations are working hardships on you. No matter how small or how large the idea or practice, we are interested in it.

When we receive suggestions from the field we do not file them away merely that we may possess an interesting collection. We want to make these facts and ideas available to every one of our field offices.

FUNCTIONS OF THE OFFICE OF PERSONNEL

AND

BUSINESS ADMINISTRATION

Dr. W. W. Stockberger, Director
W. A. Jump, Asst. Director & Budget Officer

W. N. Rehlaender, Asst. to Director
H. A. Nelson, Chief Div. of Operation
P. L. Gladmon, Chief Div. of Appointments
A. McC. Ashley, Chief Div. of Purchase, Sales and Traffic
E. H. Bradley, Administrative Asst.
A. Zappone, Chief Div. of Accounts and Disbursements
F. E. Singleton, Chief Div. of Accounts (Secy's Office)
R. M. Reese, Real Estate Officer
L. O. Robbins, Administrative Asst.

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The Office of Personnel and Business Administration is a part of the Secretary's Office, its affairs being administered by a Director. Before going into the functions of this office it may be well to outline briefly the organization and functions of the Department of Agriculture as a whole.

The act creating the Department of Agriculture was signed by President Lincoln on May 15, 1862 and in that year $64,000 was appropriated for agricultural purposes.

From 1862 until February 9, 1889 the department was administered by a Commissioner of Agriculture. In 1889, however, agriculture was given the recognition of a seat in the President's Cabinet and Norman J. Colman, previously Commissioner, became the first Secretary of Agriculture. The Department of Agriculture is the largest organization of its kind in the world. Its scope, year by year, has increased until today its work deals with every phase of agriculture as well as many related problems.

From a personnel of 29 employees in 1862 with an appropriation of $64,000 the department has grown to its present size of 28,163 employees with a total appropriation of $349,246,090 for the fiscal year ending June 30, 1931.

This growth is shown by the following table:

Year	Number of Employees	Appropriation
1862	29	$ 64,000
1871	84	188,180
1881	104	284,300
1891	1,577	2,336,502
1901	3,388	4,423,500
1911	12,704	20,832,636
1921	18,748	151,945,760
1931	28,163	349,246,090

The department occupied 3,100,569 square feet of office and laboratory floor space during 1931. Of this 1,354,319 square feet was located in the District of Columbia; 429,140 square feet was used rent-free in Federal buildings outside of the District of Columbia and 1,317,114 square feet was rented outside of the District of Columbia at a total rental of $745,692.

Organization

The Department of Agriculture is one of the ten major executive departments of the Federal Government. Its affairs as a whole are supervised and controlled by the Secretary of Agriculture who formulates and establishes its general policies. In his task of supervising the work of the department the Secretary is assisted by a general administrative staff, including an Assistant Secretary and five Directors, who have general supervision over all the work of the department of the type which the title of his position implies.

These Directors are:

(1) Director of Scientific Work
(2) Director of Regulatory Work
(3) Director of Extension Work
(4) Director of Personnel and Business Administration
(5) Director of Information

On a par with these Directors is the Solicitor who is the legal advisor to the Secretary, and who directs and supervises all legal work of the Department. In addition to the Directors who function as Assistant Secretaries do in other branches of the Government, the activities of the department are divided among fifteen bureaus and each of these bureaus is in turn divided into:

(1) Branches
(2) Divisions
(3) Sections
(4) Units

Functions

I will not attempt to go into details as to the functions of each of these fifteen bureaus, which are:

Weather Bureau
Bureau of Animal Industry
Bureau of Dairy Industry
Bureau of Plant Industry
Forest Service
Bureau of Chemistry and Soils
Bureau of Entomology
Bureau of Public Roads
Bureau of Biological Survey
Bureau of Home Economics
Bureau of Agricultural Economics
Bureau of Plant Quarantine and Control Adm.
Food and Drug Administration
Grain Futures Administration
Bureau of Agricultural Engineering

The work of these bureaus, however, may be grouped under six general heads.

(1) Research
(2) Extension, education and information
(3) Eradication or control of plant and animal diseases and pests.
(4) Service activities, such as weather and crop reporting, forest and wild life administration.
(5) The administration and enforcement of regulatory laws.
(6) Road construction.

In order to eliminate confusion and waste in business procedure and to effect greater economy in the business and personnel practices of the department, the Office of Personnel and Business Administration was organized in 1925 by consolidating nine separate and independent business and personnel offices. In personnel administration, organization, budget and fiscal matters, this office cooperates with directors and bureau chiefs in effecting improvements. It purchases needed equipment and disposes of unneeded materials, It solves transportation problems involved in official travel of members of the department and in transferring necessary material between headquarters and field. It provides suitable working quarters for the department and cares for the department's buildings and equipment.

There are a number of central agencies which are concerned with matters pertaining to personnel and business activities of the Government. These agencies are:

(1) Civil Service Commission
(2) Personnel Classification Board
(3) Employees' Compensation Commission
(4) Bureau of the Budget.
(5) The General Accounting Office
(6) Veterans' Administration

and various boards operating under the authority of the Chief Coordinator.

The office represents the department in dealing with these agencies and is organized into two major units:

(1) The Branch of Personnel
(2) The Branch of Business and Fiscal Operations

The Branch of Personnel of which there is a Division of Appointments and a Division of Organization and Classification, represents the department in dealing with

(1) The Employees' Compensation Commission
(2) The Civil Service Commission
(3) Veterans' Administration
(4) Personnel Classification Board

The Division of Appointments is responsible for the personnel changes of the department in so far as such changes are affected by civil service rules, by administrative and fiscal regulations, or by decision of the Comptroller General. It maintains cumulative records of appointments, promotions, demotions, resignations, removals, retirements, leave and furloughs without pay. It assists in developing tests and examinations for applicants

for positions in the department.

The Division of Organization and Classification handles requests for the classification of the positions of Department employees, according to the character of the work and the degree of responsibility involved, in so far as these positions are defined by the Personnel Classification Act. It presents classification cases before the Personnel Classification Board. It studies the organization of various bureaus, analyzes and describes bureau functions, considers proposed changes of departmental organizations, and the effect these changes will have on the personnel and on the effectiveness of departmental operation.

Branch of Business and Fiscal Operations

The branch of Business and Fiscal Operations under the general supervision of the Assistant Director and Budget Officer, comprises the:

(1) Division of Accounts and Disbursements
(2) Division of Purchase, Sales and Traffic
(3) Division of Operations
(4) Office of Accounts for the Office of the Secretary.

The Assistant Director and Budget Officer supervises the preparation of the department's estimates of financial needs and their presentation before the Bureau of the Budget and the appropriation committees of Congress and serves as the department's general contact officer with these agencies. He exercises general oversight over the business and fiscal affairs of the department. This involves the allotment and apportionment of appropriations, questions of general policy dealing with expenditures, legislation involving expenditures of funds, accounting or other procedure involving action by the General Accounting Office, correspondence reports to Congress and other such related matters.

Division of Accounts and Disbursements

The Division of Accounts and Disbursements maintains the central departmental appropriation ledgers and records of receipts and expenditures, provides all bureaus with periodical statements of balances and affords technical advice to the special temporary disbursing agents of the department. It includes the main disbursing office of the department wherein all funds are disbursed and all receipts collected for the department except those handled by the fiscal agents of the Forest Service and the special disbursing agents. This division also handles in conjunction with the Budget Officer, the compilation of the detailed estimates of appropriations.

The Division of Purchase, Sales and Traffic

This division coordinates the purchase, property, sales and traffic work of the department. It solicits and accepts bids for the department's procurement of a large percentage of the department's material, supplies, and services, through the Central Supply Section. It distributes supplies in the District of Columbia. It serves as a clearing house for the interchange of surplus property between bureaus and departments. Through the traffic section, it routes all departmental equipment and supplies in a

manner affording the most economical transportation, estimates shipping costs where it is a factor in determining the lowest bid for material to be purchased, assists the personnel with its passenger transportation problems and provides freight and passenger rate information to the department's auditors.

The Division of Operation

The Division has charge of miscellaneous operating matters, including the operation of the sections of mail and files, telephone and telegraph, the watch force engaged in guarding the buildings and grounds of the department, the cleaning and labor forces, and the mechanical shops of the department. The shops construct special scientific and other equipment used by the department, maintain the power plant and department garage and perform a variety of other services.

Office of Accounts (Secretary's Office).

The Office of Accounts for the Office of the Secretary maintains the operating and accounting records for the Office of the Secretary, the Extension Service, the Office of Experiment Stations, the Office of Information, and the Grain Futures Administration. [illegible] These records are to be distinguished from the general departmental accounting records maintained in the Division of Accounts and Disbursements.

In addition to supervising the work of the Office of Personnel and Business Administration, the Director, Dr. W. W. Stockberger, was designated by the Secretary on February 2, 1931 as chairman of a real estate committee composed of an executive secretary and the real estate officer of the department. The functions of this committee are to plan a constructive program for the most effective housing and land utilization in the department. A primary consideration of this committee is the possibility of consolidating some of the suburban stations near Washington to improve the efficiency of operation. There are three such stations in Virginia and eight in Maryland, all within commuting distance of headquarters. The bureaus conducting scientific work at these stations are cooperating in this endeavor. The committee, advisory in character, devotes its time to fact finding and planning.

In conclusion I should like to give just a few pertinent facts regarding the work of the Office of Personnel and Business Administration.

According to the records in the Division of Appointments the department experienced a normal turnover of 7.95 per cent during the last fiscal year as compared with 9.79 per cent during the fiscal year 1930. The department appointed 10,258 new employees during 1931 compared with 7,707 the previous year.

The department retired 218 employees, divided as follows, during the last fiscal year:

Services	Annuity Retirement	Disability Retirement
Professional	36	7
Subprofessional	88	17
Clerical, Adm., Fiscal	20	20
Custodial	27	3

The averages of the annuities in the various groups are as follows:

Professional	$1,006.77
Sub-professional	926.61
Clerical, Adm. Fiscal	907.83
Custodial	749.42

From the records of the Division of Purchase, Sales, and Traffic, we find that the division solicited and accepted 4,456 bids during the fiscal year 1931, approved 150 bureau purchase orders, each in excess of $500, inspected forest road contracts to the extent of $6,500,000 and purchased $1,300,000 worth of road building equipment for the Forest Service; obtained authorization to spend $225,000 for the purchase of 170 new automobiles, and disposed of $40,637.64 worth of perishable products resulting from the department's experimental work in and near Washington.

Message to employees of Bureau of Plant Industry engaged in Blister Rust eradication and control work.

From Dr. W. W. Stockberger,
Director of Personnel & Business Admin.

It was my pleasure recently to visit a number of Blister Rust stations in the Northwest. I went out into the field with the men actually engaged in performing the very important task of saving the white pines for future generations. I have always been impressed with the men who are making this their life work; my recent visit more than ever convinced me of their loyalty, ability, and devotion to duty.

Many occurrences on this trip again impressed upon me that a closer contact and a more thorough understanding of the field problems is essential to the efficient conduct of the Department's affairs, consequently my office welcomes the opportunity of being represented at your conference. Permit me then to congratulate you upon your foresight and cooperative spirit in making this meeting possible. I believe that other branches of our far-flung Department would do well to follow your example.

About 82 percent of the Department's personnel is located in the 48 states, the insular possessions, and many foreign countries. Those of us who are located in Washington recognize that you field employees are just as closely associated with the Department's affairs as though you were in

the District of Columbia. Anything done to promote a complete spirit of cooperation between Washington and the field is certainly a step in the right direction.

It is often said that the Department of Agriculture is one of the most progressive government organizations in handling its personnel and business matters; nevertheless, we have only made a beginning in our program of personnel management. Our goal is yet some distance away. It is hoped that we will be able to launch, in the near future, a definite program involving recruiting, placement, preparation of examinations, efficiency ratings, etc. With the maintenance of a complete placement file in the central office, the Department may utilize the services of its present employees to the best advantage. Indeed, while we shall continue to recruit young men and women from commercial life, we hope that eventually only an occasional appointment from the Civil Service register will have to be made to fill vacancies in the higher grades.

The appointment by the President of a council of Personnel Administration and the passage by Congress during the past several years of such important legislation as retirement, personnel classification, and Saturday half holidays, demonstrates that the government as a whole is aware of the possibilities of a definite personnel program.

The President's Council of Personnel Administration, of which I am a member, is making rapid strides in its work of personnel administration. The present business depression has very forcibly brought to the attention of executives that personnel management is no longer a theory, but that it must be an integral part of every business organization.

It is just as essential, in my opinion, that the Government avail itself of and utilize new and improved methods of personnel management as it is that we appropriate the latest discoveries in the scientific world.

I trust that this meeting will be very helpful to you in your future work on blister rust control and if any of you have suggestions or comments to offer regarding the work of my office, I wish to assure you that they will be gladly received.

Discussion

In response to a request from Mr. Filler (Boston Office) to outline the principles of good organization, Mr. Rehlaender presented the following statement:

Ten Commandments of Good Organization

1. Definite and clean-cut responsibilities should be assigned to each executive.

2. Responsibility should always be coupled with corresponding authority.

3. No change should be made in the scope or responsibilities of a position without a definite understanding to that effect on the part of all persons concerned.

4. No officer or employee, occupying a single position in the organization should be subject to definite orders from more that one source.

5. Orders should never be given to subordinates over the head of a responsible officer. Rather than do this the officer in question should be supplanted.

6. Criticisms of subordinates should, wherever possible, be made privately and in no case should a subordinate be criticized in the presence of officers or employees of equal or lower rank.

7. No dispute or difference between officers or employees as to authority or responsibilities should be considered too trivial for prompt and careful adjudication.

8. Promotions, wage changes, and disciplinary action should always be approved by the officer immediately superior to the one directly responsible.

9. No officer or employee should ever be required, or expected, to be at the same time an assistant to, and critic of another.

10. Any officer whose work is subject to regular inspection, whenever practicable, should be given the assistance and facilities necessary to enable him to maintain an independent check of the quality of his work.

Mr. Strait (N.Y.) inquired why blister rust control agents are not under Civil Service. Mr. Rohlaender replied that this matter is being studied at the present time, and a definite decision is expected shortly.

PUBLIC RELATIONS IN FORESTRY WORK.

Harris A. Reynolds, Secretary, Massachusetts Forestry Association.

Almost every form of human activity is concerned with public relations. From the corner grocer to the railroad, success in business depends upon public confidence, and the organization which ignores that fact will soon be in difficulties. As employees of the public in this Blister Rust work, we may find it profitable to review occasionally the fundamental principles that have led to success in business and which have been developed throughout the ages. In essence the process of business consists of two main steps, namely, to sell the product or idea, and to deliver the goods.

The principles of salesmanship are four in number. First, the salesman must obtain the favorable attention of his prospective customer; second, he must create interest in the article or idea; third, that interest must be aroused to the point of desire, and the desire must be sustained until it results in action. We are salesmen of an idea for the protection of the white pine forests and our customers are the owners. Thousands of sales

have been made and hundres of thousands of dollars have been spent by the owners of white pine. Thus far we have been successful, but the sale is only the first important step in the building of a business. Repeat orders are essential to sustained profits and therein lies the crucial test of any organization. If we are to deliver the goods we must hold the confidence of these owners by the same processes used in a successful business. We must follow through, and to do this we must see to it that the costs are as represented, that eradication is thorough and effective, that reeradication is done at the proper times and once an owner entrusts us to protect his pine the responsibility is ours to bring those trees through to maturity. We have set about a task that must be continuous over the period of production of a crop of timber, and if for any reason our vigilance is slackened, the work already accomplished and the money spent may be largely lost.

In this fight for the saving of the white pine as a commercial species let us not forget that this work is only one of the main factors in the great task of restoring protecting, and maintaining the forests of this country. Let us not confine our thinking to this one phase of the forestry problem but be ready and willing to cooperate with our fellows who are working in equally important fields of the same great undertaking. We will reach our own goal more easily and quickly if we are not afraid to help the other fellow to reach his objective. Furthermore an effort on our part to get the other fellow's viewpoint will keep us out of ruts.

Although my personal connection with this work has been confined largely to the educational and legislative phases I have followed with keen interest the progress the organization has made. As I see it your unusual success has resulted from the fact that you have first set up an ideal to be attained-the saving of the white pines. You have had a definite and well thought-out program, and finally you have carried out that program on scheduled time through personal and continuous contact with the citizens concerned. It would be difficult to find in public service to-day a better example in business building than has been set by your organization. In other words you have thus far delivered the goods and the public confidence which you have created and so ably justified will in my judgment support you in the continuation of this fight to save the white pines.

THE EUROPEAN PINE SHOOT MOTH.

By H. W. Hicock, Assistant Forester, Connecticut Agricultural Experiment Station.

The European pine shoot moth is a small, rather pretty, russet brown moth with silvery markings on the wings. The insect requires one year to complete its life cycle, the adults emerging the latter part of June and oviposition taking place during July. Eggs are laid on the buds or on adjacent leaves and within a few days the tiny brown larvae hatch and begin feeding. During its early life the larvae usually, but not always, mines the base of one or more pairs of needles causing them to turn brown. These dead

needles are one of the best indicators of the presence of the feeding larvae. As feeding progresses the larvae bores into one or more buds, sometimes mining them completely and sometimes injuring them on one side thus causing them to curl the following spring when growth starts and produce the "bayonet injury". The injury to the buds is accompanied by a flow of pitch which cements the buds together. The amount of damage which may be done to a single bud cluster depends on the number of larvae to a cluster. If only one larvae is present it probably will not kill all the buds but several larvae may accomplish this feat and stop all growth for one year.

The larvae attain a length of about 1/4 inch by November. It is not definitely known just where they spend the winter or whether they continue feeding during the cold months. However, feeding is either resumed or continued in the spring and by May the larvae have attained a length of more than 1/2 inch and are ready to pupate. The bud in which pupation takes place usually starts to grow in the spring and, after becoming from one to three inches long, die and become more or less crescent shaped. The pupal chamber is located near the base of the bud. It is during the late larval and pupal stage that the injured buds are most conspicuous.

The above is a somewhat sketchy portrayal of the life history, but it must be remembered that detailed observations have been under way only four months and it will be next June (1932) before the records of a full life cycle can be completed.

While there are a large number of species of pine that are attacked by this insect, from the standpoint of forestry in the northeastern United States, the susceptibility of red pine to damage is of the greatest importance, as it may necessitate considerable changes in our planting programs. Curiously enough, white pine although it may be infested, does not seem to be injured to any appreciable extent. Scotch pine, the host of the insect in Europe, may be heavily infested, but the resulting damage is less than for red pine. One might wish that the observation of a certain nurseryman on Mugho pine might apply to other species. He said that shoot moth on Mugho was a fine thing because it saved him the trouble of keeping the trees cut back.

The control of the insect will be a diffucult and expensive job under the most favorable conditions. The most feasible means of control known at present is to remove infested bud clusters. This can be done on trees which are not more than eight feet tall. If the work is done in the fall when the only indicators of injury are dead needles and pitch masses between the buds (in other words, when the injury is quite inconspicuous) the cost will run from five to fifteen dollars per acre depending on the intensity of infestation. These figures are based on work carried out experimentally on about 20 half acre plots in the fall of 1931. If the work is done in the spring just prior to the emergence of the adults when the infested buds are quite conspicuous, the cost will probably run from two to five dollars per acre. Whether or not control can be practiced in the spring depends upon whether there is a sufficiently long period between the dying of the infested buds and the emergence of the adults for the work to be completed.

Where the insect has become well established in plantations from ten to twenty feet tall, control becomes very difficult both from the standpoint of cost and of physical accomplishment. At present there does not seem to be

a loophole in the insect's armor when it attacks large trees. Any suggestions which you may offer will be greatly appreciated.

During the progress of a general survey of plantations in Connecticut in 1931, it was found that over half of the red pine plantations in southwestern Connecticut were infested with shoot moth and it was decided that an intensive study of the situation was necessary to determine the following points:

1. The general distribution of the insect throughout the state.
2. The complete life history of the insect, already begun by Dr. Friend.
3. The rate of spread under varying conditions.
4. Overwinter mortality of the larvae.
5. The cost and feasibility of various types of control.
6. The optimum conditions for the production of adventitious buds to replace those removed.

It is too soon to give you any of the results of these studies, but next July we hope to have secured sufficient data to enable us to formulate a sound control policy.

The following observations made during the progress of the investigations are, perhaps worthy of mention:

a. The insect seems to infest terminal and lateral bud clusters indiscriminately.
b. Barriers and overhead shade are apparently no obstacles to the insect.
c. The amount of current infestation seems to diminish as one progresses northward.
d. The amount of current infestation was extremely high as compared with that of other years.
e. Under normal conditions red pine shows very good powers of recovery through the sending out of adventitious buds.
f. There are several native shoot moths which cause injury similar to that of the European species.

I would like in closing to stress the fact that in the early stages the injury caused by the insect is very inconspicuous and may easily be overlooked in a casual observation and also the fact that the effectiveness of control measures depends upon detecting the presence of the insect within one year after its entry into a stand.

Discussion:

Mr. McIntyre (N.Y.) did not feel that bud pruning will affect the economical control of this pest, although it is clear that it will be necessary to approach control while the insect is in the bud. The larvae overwinter in a chamber of pitch and if the chamber can be reduced for a certain length of time, climatic conditions may kill the larvae without injury to the buds. Spray solutions have not as yet proved effective, except that kerosene emulsion applied warm to dissolve the pitch has had some effect. Pruning is too expensive. In some instances too many buds are taken out, and in other cases

some buds are left that should have been removed.

Mr. Pierce (D.C.) remarked that in the case of a near relative, the Nantucket Pine Bud Moth, attacking jack pine (P. banksiana) and western yellow (P. ponderosa) the jack pine over the Nebraska National Forest at Halsey seem to outgrow the attack as they grow older while the ponderosa do not receiver as well from attack. Parasites seem to have been somewhat effective and possibly they may help in this instance.

Mr. McIntyre (N.Y.) vigorously asserted that parasites cannot be depended upon. Entomologists thought that parasites would take care of the situation, and they have not.

Dr. Martin (D.C.) called attention to the fact that the insect has been with us for fifteen years or more as a nursery pest on P. mugho and Austrian pine, and that it has now apparently spread.

Mr. McIntyre (N.Y.) pointed out that the seriousness of attack varies considerably in different sections.

Mr. Mandenberg (Mich.) informed of two infestations on ornamental western yellow pine in southern Michigan. No provision has as yet been made for control.

Mr. Furford (R.I.) inquired as to how much of a spread is anticipated.

Mr. McIntyre (N.Y.) believed that at present the spread is only through the transportation of nursery stock.

Mr. Hicock (Conn.) did not wish to give the impression that bud cutting is the only method of control. He also pointed out that the spread and damage noted at the present time may be abnormal; but on the other hand, it may be a very serious pest. If the spread of the moth should continue, it may wipe out the red pine in southern Connecticut.

Mr. Reynolds (Mass.) inquired as to who was doing any investigative work regarding the control of this pest.

Mr. Hicock (Conn.) replied that some work is being done in New York and Connecticut.

Chairman Boyce (Conn.) pointed out that there is a real danger involved in the creation of large areas of red pine.

Report of the Committee on the 1932 Conference

The Committee appointed to select a meeting place for the 1932 Conference is unanimously in favor of holding said Conference at Washington, D. C. with some point in Maine, preferably near the Kittery Point area, as second choice.

It is recommended by this Committee that Mr. Filler of the Boston Office appoint a committee of three (two agents and the State Leader) from each cooperating State to submit to his office a list of suggestions which are of special interest to the agents. It is believed that by following this procedure valuable material heretofore overlooked, will be uncovered and presented for discussion.

W. O. Frost, Chairman
S. H. Boomer
H. G. Strait

Report accepted.

REPORT OF THE COMMITTEE ON RESOLUTIONS

WHEREAS this Blister Rust Conference has been made possible through the approval and cooperation of Doctor William A. Taylor, Chief of the Bureau.

BE IT RESOLVED, that we express to him our appreciation of his interest and assure him of our continuing loyalty to the work in which we are privileged to cooperate with him.

WHEREAS at our Conference of last year we missed the presence and inspiration of our leader, Mr. S. B. Detwiler,

BE IT RESOLVED, that we herewith express to him our great satisfaction in having him with us at this Conference in which, as always, his wholehearted participation has inspired us with renewed interest in our work.

WHEREAS certain agents and others who have attended former Conferences are owing to sickness or other causes, prevented from attending this year,

BE IT RESOLVED, that we record our regrets for their enforced absence from this Conference to which they would have contributed so much.

BE IT FURTHER RESOLVED, that we express our appreciation to residents of the town of Salisbury and the management of the Gateway Inn; to State Leader Riley of Connecticut, his assistants, and all others who have contributed so much to the success of this conference.

Resolutions Committee:

L. E. Newman, Chairman
W. O. Filley
E. M. Brockway

Report accepted and resolutions adopted.

ATTENDANCE LIST

Name	Address
Adams, M. R.	New Haven, Conn.
Ayres, T. T.	New Haven, Conn.
Baker, F. J.	Keene, N. H.
Barber, P. E.	Saratoga Springs, N. Y.
Baxter, D.V.	Ann Arbor, Mich.
Boomer, S. H.	North Conway, N. H.
Boyce, J. S.	New Haven, Conn.
Bradbury, H. G.	Belfast, Maine.
Bradder, W. E.	Rutland, Vermont.
Brockway, E. M.	North Abington, Mass.
Burgess, A. F.	Greenfield, Mass.
Charlton, J. W.	Gloversville, N. Y.
Clave, William	Worcester, Mass.
Clinton, G. B.	New Haven, Conn.
Codman, W. S.	Eldred, N. Y.
Cullen, W. J.	Laconia, N. H.
Curtis, D. S.	North Bridgton, Maine
Dean. Dr.	New Haven, Conn.
Deming, E. A.	New Haven, Conn.
Detwiler, S. B.	Washington, D. C.
Doore, G. S.	Northampton, Mass.
Eliason, E. J.	Albany, N. Y.
Fatzinger, R. P.	Harrisburg, Pa.
Filler, E. C.	Boston, Mass.
Filley, W. C.	New Haven, Conn.
Fivaz, A. E.	Warrensburg, N. Y.
Foster, J. H.	Concord, N. H.
Frost, W. C.	Augusta, Maine.
Gackenbach, J. J.	Harrisburg, Pa.
Hahn, G. G.	New Haven, Conn.
Harpp, N. H.	Warrensburg, N. Y.
Hawes, A. F.	Hartford, Conn.
Hicock, H. W.	New Haven, Conn.
Hirt, R. R.	Syracuse, N. Y.
Hodgkins, L. W.	Taunton, Mass.
Holcomb, H. W.	Peru, N. Y.
Howard, W. G.	Albany, N. Y.
Hurford, A. W.	Providence, R. I.
Kane, T. L.	Woodsville, N. H.
Kimball, G. H.	Auburn, Maine.
Kouba, T. F.	Madison, Wis.
Kroeber, J. K.	Marquette, Mich.
Littlefield, E. W.	Albany, N. Y.

Mandenberg, E. C.	Lansing, Mich.
Martin, J. F.	Washington, D. C.
May, R. M.	Harrisburg, Pa.
McCasland, H. J.	Averill Park, N. Y.
McDonnell, A. D.	New Haven, Conn.
McIntyre, H. L.	Albany, N. Y.
Meier, H. F. A.	Syracuse, N. Y.
Miller, Alton	New Haven, Conn.
Newman, L. E.	Concord, N. H.
Nichols, B. H.	Lewis, N. Y.
Paige, Raymond	Fort Ann, N. Y.
Palmer, E. H.	Essex Junction, Vt.
Perry, C. C.	Boston, Mass.
Pierce, R. G.	Washington, D. C.
Place, J. R.	New Haven, Conn.
Posey, G. B.	Washington, D. C.
Pratt, W. F.	Saranac Lake, N. Y.
Putnam, H. N.	Milwaukee, Wis.
Rehlaender, W. N.	Washington, D. C.
Reynolds, H. A.	Boston, Mass.
Richardson, G. F.	Lebanon, N. H.
Riley, J. E.	New Haven, Conn.
Ritter, L. B.	St. Paul, Minn.
Roop, W. T.	Arlington Heights, Mass.
Ross, R. M.	New Haven, Conn.
Scoville, Robert	Salisbury, Conn.
Sheals, R. A.	Washington, D. C.
Spaeth, J. N.	New Haven, Conn.
Spaulding, Perley	Amherst, Mass.
Stevens, G. E.	Albany, N. Y.
Stimson, K. K.	Boston, Mass.
Strait, H. G.	Hyde Park, N. Y.
Swain, L. C.	Exeter, N. H.
Thompson, R. I.	Lansing, Mich.
Warner, D. T.	Salisbury, Conn.
Wheeler, R. E.	Springfield, Mass.
White, A. C.	Providence, R. I.
White, E. J.	Concord, N. H.
White, J. M.	Waterville, Maine
Woodward, E. G.	Warrensburg, N. Y.
Woolschlager, T. P.	Boonville, N. Y.